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SCIENCE, WORK, AND CRITICISM*

BY GRAHAM LUSK, PH.D.†

THE officer of the Alpha Omega Alpha Society of the Harvard Medical School who was kind enough to ask me to address you indicated that you would be interested to hear something of the history of the development of our present-day conceptions of the science of nutrition. I have written on other occasions of the activities of Lavoisier and of Liebig. One must go back to the old days in Germany to obtain a correct picture of the influences which are playing upon modern medicine today. Dr. Welch said the other night in New York that he had brought to America what his German masters had taught him. Just as the beginning of German chemical science came from Liebig, so the beginning of German medical science came from Johannes Müller, who was born in 1801, two years before Liebig, who became professor of physiology at the University of Bonn at the age of twenty-five, and who taught physiology in Berlin from 1833 until his death in 1858. His pupils included Helmholtz, Henle, Du Bois-Reymond, Brücke, Virchow, Traube, Theodor Schwann, and Pflüger. Johannes Müller commanded the whole field of physiology. I would like to tell you a little about his life. Naunyn gives us a living picture of Johannes Müller. As student in Berlin in the sixties Naunyn became associated with Lieberkühn and Wagener, both of whom had been intimately associated with Müller and who were the last pupils he had trained. They piously venerated his memory. "Müller would have said that, Müller would have done thus; Müller liked this person; he could not tolerate that one." Naunyn says that he began to feel as though he were a pupil of Müller without ever having seen him. He learned to know him as a teacher. The watchword was *work*, research work; microscopy, experiment; anatomical, biological, chemical, and physical experiments. The only problems worthy of consideration were those which exist or which manifest themselves in nature. The endeavor was to discover something not then known, to enlarge the vision. The discovery must be demonstrated and submitted to sharp criticism. In general no emphasis was placed on the importance of a discovery, the smallest point, if it was new, was a valuable contribution. Naunyn as an old man remembered the exceptional joy of both of these pupils of Müller when he showed them some cilia on a membrane in *Echinococcus*. Of course they were also concerned when great discoveries of wide import were made. Publication of results was accompanied by a brief description of the existing state of knowledge and then the new results were recorded. Everything must be written as briefly as possible; *only the facts*, a true research done for its own sake.

This represents the beginnings of our intellectual inheritance from Germany. It shows us the early attitude of a great leader moving in the direction of better things.

And this is still the attitude of all the great leaders of modern German thought. Thus in 1923 Friedrich von Müller wrote me:

> It does not appear to me to be important to start from *theories* or to invent *dogmas*, but to seek facts and true observations in accord with the fundamental concept of our own honored teacher, Carl Voit, who always said to his students early in his lecture course, "You need not believe anything that I tell to you in my lectures, you need only believe what I can demonstrate and prove to you". It is astonishing how simple modern theories become when one puts aside everything that is hypothetical and allows only the experimental facts and discoveries to speak for themselves.

Early in the century Laennec had discovered auscultation and had demonstrated the value of autopsy in confirming the results of this new method of medical diagnosis. Students flocked to Paris and to England to study under Louis, Cruveilhier, Graves, and Abercrombie at a time when Germany, emerging from the influence of the unholy natural philosophy of Schelling, was far behind in science. Through the gradual increase of the dominating influence of Liebig in chemistry and of Johannes Müller in physiology Germany was to rise out of sleep. One might ask, what would Germany have been without them?

In Berlin in the sixties, when Naunyn was a student, a profound transformation had taken place. He tells us that it was a proud time, a proud society of medical men. Germans, who before this had to go to Paris for training in modern medicine, could now obtain it at home, while Americans, English, French, and Russians flocked to Berlin to hear the lectures of Virchow, Du Bois-Reymond, Frerichs, Traube, and Langenbeck.

The greatness of this new German school lay in its consciousness of being based on natural science. The methods of scientific discipline used in chemistry, physics, physiology, histological and pathological anatomy were now introduced into the clinic.

*Address delivered at the Harvard Medical School, May 8, 1930, under the auspices of the Harvard Chapter of Alpha Omega Alpha.

†Lusk—Professor of Physiology, Cornell University Medical College in New York City. For record and address of author see "This Week's Issue", page 1076.

The great spirit of Johannes Müller passed away too early, at the age of fifty-seven in the year 1858, so he did not live to witness the full influence of what his powerful personality had done for mankind.

It required nearly 50 years before America experienced an awakening similar to that of Berlin in the sixties.

I have presented this picture of what was occurring in the Berlin of Johannes Müller because it covers a scientific period which was contemporaneous with that of Liebig's triumphant activity at Giessen, of which I have already written and which need not here be repeated. In 1853 Liebig moved to Munich, when he was fifty years old. He lived in Munich for a further period of 20 years. Dr. Ira Remsen, the celebrated American chemist, was a student of chemistry in Munich in 1870; he told me that at that time Liebig shared with Wagner the idolatry of the townspeople. Liebig also indulged in violent polemics against Pasteur and others

There is one picture which I would like to present to you which belongs to the history of human progress, as illustrated by the criticism by Berzelius of Liebig and his reply; the criticism of Liebig upon Voit and its repercussion; with a brief reference to the opinion of Voit upon the younger generation. The story is the same, the inability of a man in the sixties to understand a young man or to suffer criticism from him.

Liebig in 1840 and in 1842 published two small but very important volumes, the first on the application of organic chemistry to agriculture, which he dedicated to Alexander von Humbolt, and the second on the application of organic chemistry to animal chemistry, dedicated to Berzelius. Liebig was nearly forty; Berzelius over sixty years of age.

Berzelius wrote to Liebig as follows:

> So long as you interested yourself in investigations which extended the bounds of science you had my most sincere admiration. The importance of your results and their astounding number have raised you to the highest position in science. Your mental gifts, your poetical and vivid imagination, have given you the power to achieve new and unexpected results. . . . The request of the English that you prepare a survey of organic chemistry, and especially the publication of *Geiger's Pharmacy*, has caused you to make a purely literary effort. The poetical leanings of your mind, combined with a readiness of literary expression, have led you into the limitless realm of theory, where the temper of a poet is a most dangerous companion. You have been led to formulate dreams of the imagination and have clothed these with the expression of your complete conviction of their truth. Your wealth of chemical knowledge has misled you into the confident treatment of scientific problems, whose anatomical and physiological background you have not thoroughly mastered.

These were trying strictures on young Liebig, and in 1844 we find him publishing the following fiery words:

> In recent years, during which Berzelius has ceased to take any experimental part in the solution of the problems of the day, he has turned his entire intellectual power to theoretical speculations which, unsupported by personal observations, have found little response or sympathy in the scientific world. . . .
>
> At the time Berzelius first became active opinions were held which, in the interest of knowledge, he did not hesitate to oppose. He did much more than this. It is a historical fact that he changed those views through his own experimental evidence. Through the natural extension and more profound understanding of science it was entirely natural that many of his own opinions should have suffered the same fate as those of others who preceded him. From his ideas others which more nearly approach the truth must be developed. Berzelius has recently chosen to defend his opinions on the basis of his old experiments, a method which does not lead to the desired end.
>
> The authors whose work Berzelius, in entire good faith, has sought to improve have none of them accepted his views. Never, at any time or under any circumstances, would Berzelius have tolerated this kind of dominance from others, but he would have rejected it with all his power. That this has not happened to him before is because of the very high and enduring esteem in which he is held by everyone who knows of his immensely valuable work.

We now pass to a later day and generation.

In 1854 Carl Voit graduated in medicine at Munich. The following year, in order to prepare himself for a scientific career, he attended lectures in physics, chemistry, anatomy, and zoölogy. The lectures on chemistry were given by the great master Liebig, who was then in his prime, while Pettenkofer conducted the laboratory work of the course.

In 1857 Bischoff and Voit demonstrated that *nitrogen* equilibrium could be established in a dog. They also showed that muscular work did not increase protein metabolism. Voit made a theoretical distinction between "organized protein" of the living tissue and "unorganized protein" which, after absorption, was rapidly destroyed. The latter led Liebig to state that he was so bewildered that he did not know right from left, and that modern workers had no great thoughts.

An attack on Voit's work by Liebig came about 1870 when Liebig was sixty-seven and Voit was thirty-eight years old. Voit was stung to reply Perhaps, by recalling the story, it may be instructive to bring out this historical cleavage between the thoughts of an older from those of a younger generation. It needs no emphasis on my part to impress you with the fact that, if some of you of the younger generation are not better trained than the masters of an older generation, then further scientific advance will not be possible. And I here recall the words of one of our great American medical prophets, Samuel J. Meltzer,

> I shall continue to work as long as I live. There are only two things which could stop me. If any one said to me "Meltzer, your work is no longer good," then I would stop. Or if anyone said to me, "Meltzer, you can no longer understand a young man," then I would stop also.

Voit, the young man, writes in 1870 that Liebig has published an article on the source of

muscular power and on nutrition in which he adheres to his old ideas on the subject, in which he says that no advances have been made in 25 years, and in which he discards the newer researches, especially those of Voit. Liebig is of the opinion that, since chemists have recently been engaged with other matters and have taken only a superficial interest in problems of physiology and medicine, therefore chemical knowledge in this field has not become more profound.

Voit replies, one might hold in a science like physiology, in which differences of opinion can be answered only by experiment, that attacks which are not based on experiments should be disregarded, especially if one proposes to continue to do experiments oneself. Voit would gladly have accepted this view because it gave him pain to oppose publicly a man whose services to physiology ranked with the greatest ever rendered and whose ideas constituted the origin of his own work. The name of Liebig was justly so great and, because of the large number of facts involved, the formation of a correct understanding of the doctrines of nutrition was so difficult, that a halt in the further development of the subject might occur if no reply were made. Progress of knowledge in the science of nutrition was of such great importance for the physician, the farmer, and the whole body politic, that a recognition of the facts of the case ought not to be put off for another decade.

Voit pointed out that it was Liebig's good fortune to enter the scientific world at a time of the rapid development of organic chemistry. Because of his investigations and those of others into the chemical composition of food, of different organs of the body, and of the waste products of the body, he, with a master hand, was able to outline the general scope of the processes of nutrition. The knowledge of the unequal importance of different foodstuffs, the tracing of complex compounds into simple oxidation products, opened an important highway into a difficult and unexplored territory. As a turning point in physiology, Voit declares, only the immortally memorable work of Lavoisier, which a hundred years previously had elucidated the process of oxidation, was in any way comparable with that of Liebig.

Many sciences are drawn upon to explain the phenomena of life. Often the first application in biology of a discovery in pure science does not come through physiologists but through the discoverers themselves. Thus, the astronomer and physicist Kepler laid the foundations of physiological optics; Borelli, the astronomer who discovered the elliptical orbits of comets, tried to explain the mechanics of respiration and the contraction of muscles; Galvani, professor of anatomy, discovered animal electricity; Hales, an English clergyman, first measured the blood pressure; Lavoisier, a chemist, measured oxygen consumption in animals and animal heat.

Even though pure science always maintains its influence upon physiology, yet after its first impact it is the physiologist alone who has the intimate knowledge which enables him to investigate the field. It is the physiologist and not the physicist who now investigates the physical phenomena of the eye, the ear, the production of electricity or of animal heat.

The relation of chemistry to physiology is analogous to these examples. The advance in chemical knowledge and the development of organic chemistry were the elements which enabled Liebig to interpret the processes of life as had never before been possible. Not his ideas, but the experimental work of his school, enabled him to do this. Liebig himself has declared that his theories were nothing but conceptions derived from the facts discovered by himself, his pupils, by Wöhler, and others. Since a new directive force was thus contributed to science the results of his achievement were phenomenal. Even though he later complains of the slight consideration given to his views by chemists, physiologists, and physicians, yet for a long period of time his opinions commanded the field on the subjects of muscular power, on fat formation, and on the causes of metabolism.

But Liebig himself has truly set forth that all theories undergo continual change through the correction of faulty observations which were held to be correct, and through the discovery of new facts. Thus new theories arise from old ones. Liebig's theories cannot escape the same fate unless science is to stand still.

Fourteen years before, Voit declares, he had been stimulated by the work of Bidder and Schmidt to take up investigations in the field of nutritional physiology, at a time when the ideas of Liebig had been his guiding star, and he had always gladly acknowledged that he started on the ground won by him. Liebig, with the greatest sagacity, had developed a series of interpretations which were based on his knowledge of chemistry. This gave the starting point for another kind of investigation, namely that of asking the living animal itself to tell the real truth about the processes of life. Today if one wishes to make theories that are more than guesses, one must take into consideration the facts obtained through animal experimentation.

Liebig believed that the power of the mechanical work of muscle was derived from protein metabolism, but Voit in 1860, very greatly to his own astonishment, discovered that the nitrogen elimination in complete rest and after the severest form of work was entirely unchanged.

Bischoff and Voit showed that a change of diet might bring about a change in the water retention in the body and, therefore, change in body weight was not a criterion as to whether fat was added or lost to the body. This could be determined only by the respiration apparatus of Pettenkofer and Voit. Voit notes that the excretion of creatinine is not increased by work. Since Schultzen and Nencki have found that

the whole nitrogen content of ingested glycine and leucine is eliminated within 24 hours as urea, these substances are probably forerunners of urea in protein metabolism.

Liebig believed that vegetables and meat extract were the equivalent of a meat diet; "spread upon bread the extract gives it the same value as meat". Voit declared that meat extract was only a flavor. The special value of meat in comparison with vegetables he declared to be dependent on its better utilization, quicker digestion, larger protein content, and its smaller demand on the gastrointestinal digestive system.

He set forth that there is a large production of fat from protein in metabolism (and this he believed up to the day of his death).

Voit wrote:

> Liebig stands upon the viewpoints which he created through chemical discoveries 25 years ago. But, to the sorrow of those who have known him and who have honored his services to science better than his flatterers, he has forgotten that they were only ideas and possibilities whose truth had first to be tested upon animals. This is the ground upon which I stand.

A generation later, when Voit was about sixty, I heard him say that there were no good young men of forty in Germany at a time when Rubner, Kossel, and Hofmeister were that age. One of these men has written me that modern workers deal only with *Kleinigkeiten* (small things). Historically speaking, there is an age disability in his judgment of the young when a man is over sixty.

In three successive generations in which the younger man was forty and the older man sixty there was a lack of appreciation of the real ability of the younger man. Berzelius criticised Liebig; Liebig criticised Voit; Voit did not fully appreciate Rubner.

The keynote of the lives of all these men was work, laboratory work, experiment. Rubner told me once that Carl Ludwig had said to him that bed was a very expensive place. It represented lost time which could have been devoted to work. Quite recently Rubner, referring to a certain physiologist, said to me, "He amounts to nothing; he writes books; there are too many books". I have tried to make it clear that it is experimental work done for the joy of the work that leads us onward. One may dream dreams based on erroneous observations and on conclusions which are based on experiments too few in number. Such a modern dream, in my judgment, is to be found in Macleod's recently published book entitled *The Fuel of Life*. In this he accepts as true the erroneous observation that the respiratory quotient of isolated living muscle, even diabetic muscle, is always unity, an experiment which, if true, would indicate that the fuel of life is glucose. But Richardson, Shorr, and Loebel have recently shown that the respiratory quotients of normal excised renal or muscular tissues are intermediate between 1.0 and 0.7, quotients which imply the participation of fat in the oxidation, whereas the respiratory quotients obtained from similar tissues of the depancreatized dog are 0.70 to 0.75. These findings do not harmonize with the idea that carbohydrate is the sole fuel of life. But such a book as that of Macleod has a high value, since it constitutes a challenge to do productive work. Macleod is a man of the highest personal character, of high scientific achievement, but, as we have learned today, this is no protection against the destruction of theories evolved through misplaced reliance upon erroneous or incomplete experimental evidence. The words of old Voit come to me, "It makes no difference *who* is right so long as the truth be found." I realize that, from the historical standpoint, I am treading perilous ground in daring to criticise the work of one younger than I am.

When one stands upon the Acropolis of Athens amid the ruins of the Parthenon and recalls that this perfect creation once contained the statue of Minerva, made of ivory and wrought with gold, one is forced to exclaim with the poet, "Land of lost Gods and God-like men!" The Parthenon is a symbol of human greatness.

Here in the classical buildings of the Harvard Medical School are domiciled such god-like men. It is glorious to have such a combination of beauty and of worth. It is their mutual association which gives the measure of real value. Buildings, money, and advertising are cheap substitutes for human greatness. The most important thing here is the scientific work, work for the love of it, work for the joy of it. Liebig felt that talent consisted of work and will power. Men thus endowed, you know them as well as I, have given a name and a fame to the Harvard Medical School that has spread over all the earth. May they continue to multiply and bring forth seed after their kind.

The main source of the material for this article is derived from Naunyn, B.: *Erinnerungen, Gedanken und Meinungen*, J. F. Bergmann, Munich, 1925, and Voit, C.: "Ueber die Entwicklung der Lehre von der Quelle der Muskelkraft und einiger Theile der Ernährung seit 25 Jahren," *Ztschr. f. Biol.*, 1870, 6, 305.

NEW ENGLAND HEALTH INSTITUTE

WHERE ARE WE GOING IN TUBERCULOSIS CONTROL?*

BY KENDALL EMERSON, M.D.†

PROPHECIES are based on retrospect. It would be idle to attempt to forecast the future in tuberculosis control save in the light of past experience. It is an easy matter to assemble a catalog of the policies and practices pursued by the National Tuberculosis Association since its inauguration in 1904. It is a very different matter, however, to appraise their effectiveness.

We started twenty-five years ago when the death rate from tuberculosis in the United States was 200 per 100,000. Today it is 79.2 (1928 Registration Area). But just what contribution preventive measures have made, considered as a whole or taking each project separately into account, is a question the answer to which lies in the realm of pure speculation. It would be quite idle to attempt too accurate a prophecy regarding the fate of any single phase of our work. It will be more profitable to discuss the subject from the broader point of view of general tendencies rather than the details of specific projects.

1. What are the probable changes in plans for the treatment of the active case?
2. What preventive measures will probably be stressed?
3. What program of health education should be advocated and what is our contribution?
4. How are we coöperating in the general public health field?
5. Whither are we tending in matters of after-care and social rehabilitations?

TREATMENT OF ACTIVE CASE

Regarding the first of these questions, it is of interest to recall that a quarter of a century ago there were 113 sanatoria in the United States with 9,000 beds. Today there are over 618 sanatoria with 73,695 beds, and almost daily we are hearing of newly projected institutions scattered over all parts of the country. The conclusion from these contrasting observations supports overwhelmingly the practice of caring for our active cases in adequately equipped sanatoria. In view of the undeniable advantages of institutional training for the tuberculous sick, as well as their acknowledged rôle in effective treatment, we may assume that the sanatorium is a permanent institution.

SANATORIA

What changes, if any, may we expect in our present sanatorium system? In the early days and even up to the present time, isolated localities have been chosen for their establishment, for several apparently adequate reasons. There are, however, serious disadvantages in the existing plan. In the first place, patients frequently object to going so far away from home, thereby defeating our purpose to remove active cases from a community where they may be a menace to those with whom they are in contact. For the same reason, the number of patients who leave sanatoria against advice is disproportionately large, homesickness undoubtedly playing an important part.

Secondly, an important consideration is that of economy. For a good many years the National Tuberculosis Association has advocated tuberculosis wards in general hospitals, especially those located in smaller cities or rural areas. Much economy in their administration could be effected thereby, particularly in these days when surgery is playing so considerable a part in the treatment of pulmonary disease.

The third and most important argument against isolated sanatoria is the fact that by their distance from teaching centers the vast opportunities which they afford for instruction to medical students and physicians is largely missed. This lack is now being recognized by medical schools and opportunities are being sought for bringing clinical material within reach of students. Chicago University is adding tuberculosis beds to the hospital of its medical school. Syracuse is putting internes in the Municipal Hospital and Yale has arranged with the William Wirt Winchester Hospital to have all its undergraduate students receive instruction at the institution which is located within the city limits of New Haven.

These are some of the arguments that point toward a change in policy of the sanatorium of the future. These changes are in line with our advocated policies and the writer believes that they will form a noticeable modification of our present practice in the matter of hospitalization of cases.

PREVENTIVE MEASURE

The second broad trend for consideration is that of general preventive measures now employed, which include case-finding, breaking contacts, preventoria, open-air schools and many other projects. Any forecast for change in present methods of prevention can only be based on research. With this principle in mind, the National Tuberculosis Association has devoted an increasing share of its resources to studies along various lines which may be roughly grouped under social, laboratory and clinical re-

*Read at New England Health Institute—Tuberculosis Section, April 17, 1930.

†Emerson—Managing Director, National Tuberculosis Association. For record and address of author see "This Week's Issue", page 1076.

search, all of which forms part of the broad epidemiological study of the disease.

FUTURE PROGRAM COMMITTEE

In spite of the enormous amount of work already done, a review of our actual knowledge of the life cycle of the bacillus itself, of the effect of economic influence on the prevalence of the disease, of the methods of its propagation and transmission and of its varying specificity for different races, is sadly limited. Facing this discouraging fact, the National Association has during the past winter established a Future Program Committee, serving as members of which are a number of the leading tuberculosis experts of the country. This Committee has had the advantage of the advice of distinguished statisticians, students of public health and administrators and is beginning to formulate definite lines of epidemiological study which must occupy an increasing amount of our attention in the future.

One of the recommendations of this Committee is that, when possible, the National Association shall add to its staff a skilled epidemiologist and at the same time make provision for more satisfactory training of men equipped to carry on an increasing amount of scientific research along the above lines.

PROBLEMS

Among many students of tuberculosis the opinion is widespread that our economic prosperity during the past generation has been an important factor in lowering our mortality rate, but that it has not affected to an equal degree the widespread infection from the disease. Natural fear arises that if we should suffer a general economic depression with the return to less prosperous living conditions, the mortality might again show an alarming increase. Such a catastrophe did occur in Germany under conditions of privation engendered by the recent war. It is a logical objective to determine more scientifically the method whereby the disease maintains its endemic proportions and the epidemiological questions involved have by no means received a satisfactory answer.

The racial incidence of tuberculosis is another unsolved problem. While the Negro death rate has decreased at a pace somewhat resembling that of the White, actual Negro mortality is still from two to four times higher, and the same appears to be true among Mexicans and certain other fractions of our population.

No one can as yet appraise with accuracy what we speak of as resistance against the disease assumed to be produced by the initial or childhood type of infection. Until studies of the antigenetic properties of the blood are farther advanced than at present, such questions will remain as indeterminate factors in our future program.

Enough has been said to indicate the lines of thought along which the Future Program Committee is working. While it is not likely that any revolutionary recommendations will grow out of this study, some of the conclusions reached may profoundly modify our present day practices.

PROTECTION OF THE CHILD

Until such time it is probable that far more work will be done on the development of the *preventorium type* of care applied to children. This does not mean necessarily the establishment of any enormous number of actual institutions, but it does mean a vastly increased protection for babies and young children against contact with cases of active disease. Whether or not Dr. Calmette's vaccine, popularly known as B.C.G., will figure as an important element in this part of our future program is still a matter of uncertainty. It would be idle to ignore the reports now reaching us from France as to the success of its use; on the other hand there is considerable improbability that the same need for infant protection will arise in this country and for that reason it is doubtful whether there will be any advocacy of its generalized use. It undoubtedly might prove of real service in individual cases, or under certain crowded conditions, or where the epidemic existence of the disease was most marked.

By the *preventorium type* of care is meant all means that can be reasonably employed to break contact between a child and an infected adult. To a considerable extent this would have to be done by isolating the child, for which purpose institutional preventoria may be required for an indefinite period in the future. There are many disadvantages in taking a child out of its home and it is possible that more economical solutions of the problem may arise. There can be no doubt that the future is to see a vast increase in the so-called open-air schools. This does not mean the extreme type of school where very low temperatures are maintained with their resulting discomfort to scholars. It does mean in the long run a vastly different attitude on the part of the public toward minimal requirements for all schools.

If the open-air school is good for the contact children or the subnormal or handicapped scholar, it is certainly not harmful for the robust individual. Ideally, the school of the future should be a one hundred per cent. open-air school, affording opportunities for the specialized treatment of each individual scholar which may be indicated by his particular need. True, the expense involved is a bit staggering, but we are never going to approach a one hundred per cent. health standard for our school children until the best protective methods are available to each and every one of them.

CASE FINDING

Pausing only a moment for a consideration of future means for detecting existing infectious

cases, one can only remark that up to the present the theoretical measures, such as reporting of cases, adequate public health nursing, proper housing regulations and the supervision of health in industry, have as yet scarcely been tried. It would be rather begging the question in any future prophecy of control methods of tuberculosis to invent new devices before testing thoroughly such rational preventive measures as these. How this ideal is to be achieved is one of the big problems of the future and that brings us to our third topic of discussion, namely, health education.

HEALTH EDUCATION

The methods employed by the National Association and at present advocated may be divided into two broad classes, first, general publicity directed primarily toward the adult public, and second, child health education, which is a part of the school curriculum. It does not seem probable that many new devices for improving the dissemination of information through publicity will be found. Existing channels should be deepened and broadened. The public health service itself has in the last few years taken this matter with increasing seriousness and all of the more active state and many local departments are issuing pamphlets and publications on the subject of preventive medicine which have an increasing wide distribution.

The volunteer agencies are at the same time enlarging their contributions and the radio will without doubt play an increasing part in this general program. Its effectiveness generally will grow as more children with a health education program are graduated from our schools, since they, in contrast to their parents, will have had the soil cultivated to a greater extent for the reception of the seeds of preventive medical instruction.

Child health education began as a part of the public school system only about a dozen years ago. It has developed with very striking rapidity and like most such rapid growths is now in a state of considerable chaos. The subject matter is medical and the channels through which the instruction must come is educational. Complications have been and are inevitable, and the future must find a way of smoothing out the tangles. Fortunately, the National Education Association has recognized the fundamental importance of health education and is more than ready to coöperate in giving it an established and appropriate position in the curriculum.

The question of whence the necessary material for instruction shall come and how it shall be administered is not an easy one to solve in view of the fact that so highly technical a subject must be entrusted to the hands of lay teachers to interpret. By patient effort this will be accomplished, but it is one of the hard tasks of the future and one in which the National Association and all its branches have a profound interest. It is proposed to enlarge the scope of the National's child health education department in an effort to help more effectively toward a solution of this problem. I believe that more practical developments will result along this particular line of work than along any other of our enterprises for perhaps the next decade or two.

COOPERATION IN THE GENERAL PUBLIC HEALTH FIELD

In the inauguration of the work of the National Tuberculosis Association it was desirable, as well as inevitable, to place chief emphasis on actual preventive work in tuberculosis itself. From the first, however, it was recognized that any attempt to control the disease involved all fields of public health enterprises, such as sanitation, food protection, housing, conditions of labor, as well as the health of the community and the prevention of communicable diseases.

Subsequent to the formation of the National Tuberculosis Association, other volunteer health organizations have grown up, each devoting its primary attention to one of the various branches into which health work and the control of communicable diseases may be divided. In view of the characteristics of tuberculosis, it is evident that the prevention work of such organization bears a close relationship to the objectives at which we have aimed, namely, improvement in health standards and economic conditions.

Through the formation of the National Health Council an attempt was made to coördinate the work of all such volunteer health associations. This has been partially successful, but the future should see a far closer community of effort between all associations having as their main object public education in preventive medical principles. Some progress can be reported during the past year.

It is believed that there are influences at work which may accelerate this progress. Among others it is fair to allude to the White House Conference on Child Health and Protection which has aroused national interest in President Hoover's familiar doctrine that the future health of the race depends on the protection of the child. The fact that all health organizations have been asked to participate in this conference and that most of us are making special studies which shall serve as a basis for discussion will undoubtedly have an important influence in showing us the close interrelationship of our several activities.

Through its nation-wide organization of state and local associations our Society is in a position to extend its coöperative aid in the broader fields of public health work. While this should mean no lessening of our primary duty to stress the importance of tuberculosis as a continuing public menace, we must still not lose sight of our opportunity to contribute to a more generalized program. Among the future trends of our

organization, it is the writer's opinion that our opportunity, as well as our obligation, toward closer coöperation with the public health service itself and with other health organizations will be increasingly stressed.

AFTER-CARE AND REHABILITATION

Finally, we must refer to the matter of after-care and rehabilitation. This has been called the third stage of treatment, the first stage being rest in bed, the second rest with graduated exercise and the third, the arrested stage or period of rehabilitation when the patient may be restored to his maximum economic efficiency. Until very lately sanatoria have paid only the scantiest attention to this really vast problem. Public Health departments have shown indifference. Society in general and industry in particular have given no considerable amount of coöperation.

One means of meeting the need is by the sheltered workshop, such as the Altro Shop, or Potts Memorial in this country, and the Papworth Industrial Village in England. At best such enterprises are in the nature of experiments or demonstrations. The vast bulk of arrested cases must be absorbed by communities from which they come. It is an expensive matter to cure or arrest a case of tuberculosis. It is an economic fallacy not to protect the investment so made by preventing future breakdowns. The difficulties and expense of this undertaking have appalled us and we have at best only marked time in attempting a solution of this problem up to the present. The future must see us adopt an aggressive policy. A hurried outline of the procedure may be stated as follows:

In the first place, patients should be kept in sanatoria until their cases are arrested to a point where they can safely be allowed to go back into their respective communities and undertake some sort of work. If their previous employment was of a nature to which they may return without danger, the problem is greatly simplified. If their subsequent career involved vocational rehabilitation and sheltered employment for a considerable period or perhaps permanently, the economic burden is greatly increased. Society's responsibility is, however, none the less clear because of the difficulties in the way.

Of course, the cases which have not benefited by sanatorium treatment must be looked upon as unproductive, chronic invalids and except for their medical supervision do not enter into this discussion.

Every discharged case should be transferred to the public health service records in the community to which he returns. This should not be a perfunctory matter but should be done with such thoroughness as to insure a one hundred per cent. supervision of all discharged cases. It does not mean an undue burden on the public health service. It does mean that that service should be responsible for seeing to it that each case is placed under the supervisory direction which it requires.

The burden of the arrested industrial case must come on industry. If we examine the records of the employees of any large factory, we will find that only in exceptional cases do we have more than one or two per cent. affected with tuberculosis. It does not seem unjust to expect such industries to absorb their sanatorium graduates, adjusting each to the specific job which he is safely capable of undertaking. This rule cannot have universal application since it is probable that certain hazardous trades would have a disproportionate number of breakdowns, but the rule still has a wide application.

If vocational rehabilitation is necessary, the state rehabilitation bureau, subsidized as they are by Federal grants, should be encouraged to handle this problem. Already such coöperation has been secured in various states and there is a promise that the work will extend rapidly in the years to come.

Underlying all discussions of future program in tuberculosis work is a substratum of research, without which there is no reliable guidance. The work of the Medical Research Committee of the National Tuberculosis Association is already familiar. Our work in social research is not so widely known, but it is progressing in many productive directions. If we had a disease to combat with the characteristics of diphtheria, smallpox, or typhoid, the problem would be vastly simplified. As a matter of fact, in spite of its existence throughout the history of mankind, tuberculosis is in some respects as much of a mystery as it was in the days of Hippocrates.

The intensive laboratory and epidemiological study must be continued and extended. There is always the possibility that this may lead to some abrupt discovery which will alter the pictures and modify our whole program of work. Pending that hoped for discovery, we must admit that the future of our work varies rather in intensity than in kind and that for the most part we must continue to build more solidly a structure on the same foundations and along similar lines as those upon which we have built for the past quarter century.

Discussion by Robert B. Kerr, M.D.

After such a splendid presentation of the subject "WHERE ARE WE GOING IN TUBERCULOSIS CONTROL" by Dr. Emerson—an address which I have had the privilege of reading before presentation here—it is not probable that there is anything I can add to what has already been so well said, yet I do not think that it is amiss to devote the time given me for discussion to emphasize some of the points brought out in the address.

Dr. Emerson frankly states that "barring some abrupt discovery as to a specific cure or

preventive for tuberculosis, the future of our work varies rather in intensity than in kind and that for the most part we must continue to build more solidly a structure on the same foundations and along similar lines as those upon which we have built for the past quarter century".

In this connection I am reminded of two axioms.

1. Hold fast to that which is good.
2. Be not weary in well doing.

Let us hold fast to that which we have found to be effective in the cure and prevention of tuberculosis in the past twenty-five years and be not weary in well doing!

Always in any movement, we have the pioneers—the blazers of new trails—the discoverers of new paths to greater progress. Theirs is a glorious privilege and a stimulating experience.

But just as important for ultimate success in any great movement are those who continually "carry on"—who till the soil and bring it to full fruition. To them does not come the thrill of the pioneer yet theirs is the abiding joy and satisfaction of fulfillment—of seeing a great work going on to victory.

It is reasonably safe to say that the tuberculosis program has evolved from the pioneer stage. The trails have been for the most part blazed—we know the paths of progress—we know how to attain results in the prevention and cure of tuberculosis. New adaptations of program will and should be tried from time to time but in the main, as Dr. Emerson has so well said, our future progress is to be built upon more intensive betterment of our program of the past

TREATING THE TUBERCULOUS SICK

First with reference to treatment of the active case of tuberculosis, Dr. Emerson has told you that in the past 25 years "the number of sanatorium beds has increased from 9,000 to 73,695 and that almost daily we are hearing of newly projected institutions scattered over the country".

This clearly demonstrates that the public will cheerfully pay for building and maintaining sanatoria. In my opinion the growth of the sanatorium movement in this country is a monument to the practical idealism of the American people for I am informed that they have voluntarily taxed themselves $175,000,000 to build these sanatoria and to expend $30,000,000 annually to maintain them. We know that these sanatoria can be carried on for the benefit of all classes with no social stigma involved. We know that these sanatoria can develop clinics in various parts of the territories which they serve, enlisting the coöperation of the medical profession, thereby stimulating better diagnosis and treatment of tuberculosis by physicians generally.

We know that for the most part our sanatoria are increasing in prestige and usefulness and meeting with increasing coöperation on the part of the public.

Yet the indications are that we need at least two beds for every annual death (averaged over a five year period). In other words it is reasonable to assume that we must double our former goal of one bed to each annual death and that the increasing interest and coöperation of the public will bring this increased capacity about in the years ahead.

There must be an aggressive effort to increase the number of sanatoria beds. Despite its deficiencies we know that sanatorium treatment provides the best opportunity for arrest because of the specialized and highly skilled treatment available.

RELAPSE—OR CURE

I was much pleased with the statement of Dr. Emerson that the future must see us adopt an aggressive policy with reference to the matter of safeguarding our investment in sanatorium treatment by preventing future breakdowns among our patients discharged as arrested cases from the sanatoria.

It is a tragic circumstance that altogether too large a percentage of our patients discharged from the sanatoria as arrested break down within five or six years after leaving these institutions.

The solution of this problem is most difficult. Keeping patients in sanatoria until well arrested would help. Proper teaching of arrested cases before discharge and frank explanation as to possibility of relapse and methods to avoid same would help. Proper selection of employment would help. Proper follow-up service by tuberculosis nurses and clinics would help. There are many difficulties to be overcome but this problem must be studied and solved if we are to continue to merit the increasing coöperation of the public in building and maintaining sanatoria. There must be considerable improvement in our sanatorium service and in our rehabilitation service.

An aggressive effort must be made to maintain the dividends earned in sanatoria treatment through educational programs, particularly for arrested cases before discharge from sanatoria and providing proper assistance particularly in the dangerous six-year period after discharge.

In addition every possible effort should be made to enable the arrested tuberculous patient to carry on as a wage earner under conditions best suitable for maintenance of arrest. This may be attained through coöperation of industry as has been suggested by Dr. Emerson.

CASE FINDING

Various demonstration services during the past twenty-five years have proven that where the ratio of KNOWN tuberculosis cases is high in a community, the tuberculosis death rate is low.

We know that few communities in the United States have as yet averaged six active cases of tuberculosis under supervision to each annual death—and this is only a minimum for several demonstrations have shown that we should have nine or ten active cases under treatment.

There is great need throughout the country for aggressive campaigns for the discovery of tuberculosis patients.

Experience has taught us that the results obtained from the law requiring the reporting of cases is far from satisfactory. We know that the only successful means of locating cases is by the clinic, conducted by physicians well trained in tuberculosis, and the clinic preceded by intensive publicity.

The future years will undoubtedly see increasing growth of the tuberculosis clinic because of its demonstrated value in the early discovery of tuberculosis cases.

We know that our young adult group is particularly prone to attack but as yet the amount of effort expended in this direction is negligible.

There is a great need for specialized chest examinations in young adults and children. These must become an important part of any well-organized school health program, particularly in the high school groups.

This particular program is expensive. Many difficulties must be overcome. In some places there may be opposition to tuberculin tests. The cost of x-ray plates of chests for children is a big item. The securing of competent diagnosticians is another difficulty. Yet I believe the future will see these problems met with increasing success and a tremendous intensification of the program for the discovery of the childhood type of tuberculosis as its effectiveness becomes demonstrated.

HEALTH EDUCATION

There is good reason to believe that the campaign of education regarding the nature of tuberculosis, its early symptoms and prevention and cure, has been notably successful. In fact it seems not unfair to say that it is possible and not difficult to carry on an educational campaign which will cause the public to go to agencies for the diagnosis and cure of the disease.

It is agreed there is great need for a continuous tuberculosis educational program throughout the country. This campaign is effective during December in the Christmas Seal Sale and in April in the Early Diagnosis for Tuberculosis Campaign.

There is great need, however, for yet more endeavor in the promotion of intensive health educational programs throughout the year to merit and secure the increasing participation of physicians and the public in tuberculosis campaigns.

Our educational programs should be such as to grip the imagination of business men and to influence leaders of industry to build for the better health of their employees and to give adequate backing to community health projects.

TUBERCULOSIS IN CHILDREN*

BY HENRY D. CHADWICK, M.D.†

TUBERCULOSIS should be considered one of the serious diseases of children. It causes the death of more boys and girls under fifteen years of age than either whooping cough, measles, scarlet fever or diphtheria, and cripples and maims many others. Many children are infected, and mild disease develops with symptoms and signs so slight that the condition is unrecognized until perhaps years have passed. We find that more than half of the cases of pulmonary tuberculosis in adolescence have had a preceding childhood type of disease. The insidious prodromal stage has passed unnoticed and with it the most favorable time for treatment.

Tuberculosis stands at the head of the column of deaths caused by communicable diseases up to fifteen years, and from that age to forty it leads all the rest. We are now in a better position to do something about it. We can recognize it in its incipient forms as it occurs in children. We know something of its habits and its habitat. We have given it a new name—childhood type of tuberculosis. This is to supersede the numerous aliases by which it has been known in the past.

The term—childhood type of tuberculosis—has been adopted by the National Tuberculosis Association and will hereafter be used to describe the diffuse or nodular lesions in the lung and associated tracheobronchial lymph nodes that result from a first infection with tubercle bacilli.

SEQUENCE OF EVENTS

The immediate response of the pulmonary tissue to a primary infection with the tubercle bacillus is a nodular or diffuse lesion which may be situated in any part of the lung.

The chronological order of the stages in the childhood type of tuberculosis is as follows: (1) The formation within the parenchyma usually adjacent to the pleura, of one, or, less commonly, more than one, focus of tuberculous tissue, with a central caseation. (2) In unfavorable cases, particularly in infants, peripheral spread takes place about the single focus or multiple foci with consequent invasion of a large area of lung. In favorable cases, which

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†Chadwick—Tuberculosis Controller City of Detroit since May, 1929. For record and address of author see "This Week's Issue", page 1076.

are not rare in infancy and constitute the majority of lesions in older children, the caseated area remains small and the tuberculous tissue about it becomes reduced to a fibrous capsule. (3) A deposit of calcium usually occurs in the caseous nodule.

A similar sequence of events takes place almost simultaneously in the tracheobronchial lymph nodes that drain the diseased area. It not infrequently happens that the primary lesion in the lung is so small that it escapes notice, and the x-ray evidence, therefore, varies according to the phase of the disease at the time the film is taken. It may show a small fresh focus or a diffuse infiltration in the lung with or without demonstrable uncalcified nodes; it may show a primary nodule in the lung with or without calcified masses in the hilum; it may show calcified masses in the hilum and no obvious disease in the lung; it may show only circumscribed masses of caseous nodes projecting from the hilum out into the parenchyma of the lung. There are occasional cases in which the infiltrative process is not absorbed and excavation of the caseous center takes place. This form of lesion may then spread throughout the lung and result in generalized tuberculosis, or it may retrogress to healing.

DIFFERENCES BETWEEN CHILDHOOD AND ADULT TYPES

Adult pulmonary tuberculosis is the result of a reinfection from an exogenous or endogenous source. It generally begins in the apex, from which it has a tendency to spread. It is characteristic of this form that the tracheobronchial lymph nodes remain uninvolved.

A tuberculous, non-apical lesion, even without demonstrable enlargement of the tracheobronchial nodes, should be considered as a childhood type of disease, unless there is evidence of an older tuberculous focus in some part of the lung.

The two types of pulmonary tuberculosis have the following characteristics:

Childhood Type	*Adult Type*
Usually occurs in children but rarely in adults.	Usually occurs in adults but may be found in children.
Result of a primary infection.	Result of a reinfection.
May be localized in any part of the lung.	Localization is apical, extending along the pleura, often posterolaterally. The first clinical manifestation, however, is often in the infraclavicular space.
Associated tracheobronchial lymph nodes are always involved but may not be demonstrable.	Tracheobronchial lymph nodes not involved by this reinfection except sometimes in the terminal stage.
Caseous lesions usually become calcified or incapsulated in fibrous tissue.	Caseous lesions usually followed by excavation or fibrosis, or both.
Infiltrated areas commonly resolve leaving trivial or no scars except for the foci of caseation, which usually become calcified.	Infiltrated areas may resolve with the production of more or less fibrous tissue.
Prognosis good.	Prognosis in children is poor.

The diagnosis depends upon the consideration of these factors:

1. History
2. Symptoms
3. Physical signs
4. Tuberculin test
5. X-ray evidence
6. Exclusion of other causes that might produce similar conditions.

HISTORY

Inquiry should be made as to whether the patient has been intimately associated with any person who has had pulmonary tuberculosis. The closer the contact, the more opportunity there is for infection. Prolonged exposure of a child to a patient with pulmonary tuberculosis usually results in infection, and excessive infection produces disease. Relationship to a person who has tuberculosis, without opportunity for contact, is not important in considering diagnosis.

SYMPTOMS

Many children have the childhood type of tuberculosis without manifesting any symptoms that can be ascribed to the disease, although they may have a progressive lesion.

Weight

Either the childhood or adult type of tuberculosis may be found in overweight, average weight or underweight children. Therefore, many cases of tuberculosis will be missed if only underweight children are examined. Those in apparently excellent general condition may have an active focus of disease.

Undue Fatigue

The tendency to tire easily is often noted and may be said to be the most common complaint in these children.

Cough

Cough may occur during the stage of pulmonary infiltration. It is not, however, a constant symptom even in this phase of the disease; and, if present, is often attributed to a cold. It is not present after the perifocal inflammation has absorbed and the caseous or calcifying stage of the pulmonary nodule is reached, or when the disease is manifest only in the tracheobronchial glands.

Fever

It should be kept in mind that a child's temperature is more unstable and is about one de-

gree higher than an adult's. Therefore, a child's mouth temperature may be within normal limits if it occasionally goes to 100°.

Pleurisy with Effusion

A pleuritic effusion occurs rather frequently in children, and if no other cause is known it should be considered due to tuberculosis of the pleura. The symptoms accompanying this condition are often so slight that the presence of fluid is often unsuspected.

Occasionally an effusion will develop while the child is under treatment. The usual symptom is a sudden rise in temperature of two or three degrees which lasts for a few days and then subsides. There is no pain to attract attention to this condition. A physical examination and roentgenogram will establish the diagnosis. Symptoms are so slight that the condition can easily be overlooked if routine daily temperatures are not recorded. This is not done in the home, and therefore, a child might have a pleuritic effusion and the febrile symptoms that accompany it might go unnoticed, or if noted would be ascribed to a digestive disturbance or a slight cold.

PHYSICAL SIGNS

A diagnosis of some phases of the childhood type of tuberculosis cannot be made by physical examination. Auscultation and percussion are of service only in finding diffuse infiltrations of the lung or such enormously enlarged nodes as are found chiefly in infants. Slight infiltrated areas, tuberculous nodules in the parenchyma, and most lesions of the tracheobronchial nodes cannot be demonstrated by physical examination. As a rule, only diffuse infiltrations or consolidations of the parenchyma give rise to physical signs.

TUBERCULIN TEST

A positive reaction to the tuberculin test always means infection with tubercle bacilli, but it does not necessarily indicate disease, or whether it is active or latent. The Mantoux or intracutaneous test is more accurate and with it a slightly larger number of reactors will be obtained than is possible with the Pirquet or cutaneous technic.

X-RAY

An x-ray is indispensable in the examination of a child's chest. Without it a positive diagnosis of the childhood type of tuberculosis cannot be made. Furthermore, a physician, however good a clinician he may be, is not justified in excluding tuberculosis without checking his physical examination of the chest with the evidence that only an x-ray film can give. There are two groups of lesions peculiar to the childhood type of tuberculosis that should be looked for in a roentgenogram—the parenchymal and the tracheobronchial.

The parenchymal lesions may be found in any part of the lung. They may be nodular or diffuse. If diffuse, the appearance is that of tuberculous pneumonia. As resorption takes place only one or more small nodules, or a few strands, remain. This evidence in time may also disappear.

The tracheobronchial node involvement may be seen as masses along the trachea, the main bronchi or their larger subdivisions. The density of the shadow cast by these diseased nodes depends chiefly upon the degree of calcification that has occurred. During the caseous stage, before any deposit of calcium has taken place, their density is so near that of the structures, vessels and bronchi with their delicate areolar sheath that together fill the hilum space, that the nodes can rarely be differentiated. In relatively few instances the nodes are so large that they protrude beyond the normal hilum area into the lung parenchyma. Then the outline of the diseased mass can be seen as it has a greater density than the lung tissue with which it is in contact. Perceptible lesions of the nodes, or areolar connective tissue of the hilum other than tuberculous nodes are rare. Artifacts due to movement cause practically all the diffuse ill-defined broadening and blurring of the hilum that is often seen. In a study of the film for evidence of the childhood type of tuberculosis both the parenchymal and tracheobronchial phases must be sought. One or the other, or a combination of both, may be present.

DIFFERENTIAL DIAGNOSIS

The diseases that sometimes simulate the childhood type of tuberculosis are bronchopneumonia, bronchiectasis, pulmonary abscess, Hodgkin's disease, enlarged thymus, neoplasms and mediastinal abscess.

The parenchymal lesions of the childhood type of tuberculosis are chiefly to be differentiated from acute and chronic non-tuberculous infiltrations of the lung. Acute bronchopneumonia usually causes a sudden, severe illness, and the density in the lung clears rapidly. Chronic non-tuberculous infiltrations, including bronchiectasis, date from an attack of bronchopneumonia, often the bronchopneumonia of measles, whooping cough, or scarlet fever. In many of these cases, the vessels of the hilum are prominent and enlarged and can be traced into the parenchymal lesion which appears as strands and spots close to the diaphragm. The history records repeated severe illnesses, with rapid recovery except for persistent sputum. Lesions of the accessory nasal sinuses or the tonsils may be associated with these chronic non-tuberculous infiltrations.

Rounded uncalcified masses projecting from the hilum or mediastinum into the parenchyma rarely have any other cause than tuberculosis. Hodgkin's disease will occasionally come into question. Apparent broadening of the mediastinum due to exposure during expiration and such broadening as normally occurs in children

with short, deep chests should rarely be confused with tuberculous lesions of the nodes, since the former presents a smooth and uniform breadth, while the latter are irregularly rounded and usually associated with rounded masses projecting from the hilum. The thymus shadow is likewise not rounded and not associated with rounded masses projecting from the hilum.

Pulmonary abscess occasionally produces signs and symptoms that may be confused with pulmonary tuberculosis. In abscess there is usually a history of a recent tonsillectomy, some other operation on the upper respiratory tract, or pneumonia, a short time before cough and pulmonary symptoms appear. The possibility of a foreign body in the bronchus as a possible cause of the condition must also be considered.

TREATMENT

Most important of all is to prevent further infections. The other essentials are rest, fresh air, suitable food and sunlight. When these factors cannot be obtained at home, institutional care is advisable. These children, except those with pulmonary infiltrations, need not be excluded from school as they have no open lesions, and therefore cannot infect other children with whom they may associate. Open-air rooms, summer camps, preventoria serve an excellent purpose in giving these children living conditions that will aid them in healing their tuberculous lesions. The removal of physical defects that retard growth should be attended to without delay. It should be noted, however, that children with diffuse tuberculous pulmonary infiltrations should not be subjected to a tonsillectomy, as surgery in such cases often activates the disease.

PROGNOSIS

This depends largely upon the child's reaction to the tuberculous infection and also to the frequency and dosage of bacilli. If further infection is stopped, most children will become adjusted to their disease unless extensive infiltration of the lung is present. Children sometimes succumb to an excessive infection, and death in these cases is due to miliary tuberculosis or a tuberculous pneumonia which becomes generalized. The majority, however are able to withstand the infection, and the diseased nodules in the lungs and nodes become calcified and well walled off by fibrous tissue. Notwithstanding how well healed these lesions appear to be, they are a source of danger during the period of adolescence. Many girls and some boys break down at that time with pulmonary tuberculosis. From one-third to one-half of the cases of tuberculosis of the adult type found in adolescents have had a preceding childhood type of disease that is evident from the calcified lesions seen in the roentgenogram. Therefore, boys and girls below the age of twenty who are known to have the childhood type of tuberculosis should be advised to avoid strenuous exercise and competitive games unless their tuberculin reaction is negative and contact is known to have ceased in early childhood. Without this precaution there is great danger in these cases that excessive strain may reactivate dormant infection.

SUMMARY

The childhood and adult forms of pulmonary tuberculosis are two very distinct types of disease. In the childhood type the lesion develops in non-sensitized tissue, and the disease is spread through the lymph channels to the nodes draining the diseased area.

In the adult type the lesion develops in the sensitized tissue, which tends to fix the bacilli in the infected area. When the spread takes place it is by continuity, by aspiration of infected material to other parts of the lungs or by the blood stream. This blood stream seeding may result in a localized lesion in bone and joint or in any organ of the body or in widespread miliary or nodular disseminated tuberculosis.

Not only is the diagnosis of tuberculosis in children very important, but the type of disease must be carefully determined. The decision as to its infectious nature, exclusion from school, necessity for active treatment, sanatorium care or home supervision and prognosis depend upon it.

Tuberculous lesions in a child are a source of danger throughout adolescence and early adult life although they may appear to be retrogressing or calcifying. The amount of protection afforded depends upon the strength and integrity of the fibrous tissue enclosing the areas of disease and we have no way of measuring it. Healing is a slow process that takes years to perfect. This we must remember and do all that we can to find and safeguard the tuberculous children during the years of their youth.

A booklet on childhood type of tuberculosis has been compiled by Dr. Henry D. Chadwick and Dr. F. Maurice McPhedran and published by the National Tuberculosis Association. This contains diagrams and reproductions of x-ray films showing different phases of childhood tuberculosis and a detailed description of the intra-cutaneous (Mantoux) and cutaneous (Pirquet) tuberculin test. This is to be distributed by the State and local tuberculosis associations from whom copies can be obtained.

DIGEST OF REMARKS OF JAMES ALEXANDER MILLER, M.D.*

Dr. James Alexander Miller, Professor of Medicine, College of Physicians and Surgeons, Columbia University, spoke on "Why People Die From Tuberculosis—A Plain Talk to Physicians and Laymen".

Dr. Miller said in part, "Despite the marked decline in tuberculosis mortality in the past twenty years there are still about 90,000 deaths annually from this disease. Of this number of

*Before the New England Health Institute, April 16, 1930.

deaths probably one-half are altogether preventible. The intensive efforts in recent years in Framingham, Massachusetts, Cattaraugus County, New York, and the Yorkville District, New York City, prove conclusively that where intensive efforts are made for the control of the disease through a well-developed and carefully worked out plan a marked decline in mortality can be effected.

"It is likely that as the years go by the tuberculosis decline will not be so pronounced because the problem can no longer be dealt with in a gross way but must be fought with increasingly refined methods. The recent slowing up in the decline of mortality in tuberculosis is proof that the methods we have used in the past must be improved and new methods devised to meet the more difficult situation of reducing the present toll. Some of the methods which must be utilized to bring about further reduction in tuberculosis are are follows: Earlier diagnosis, improvements in nutrition, universal pasteurization of milk supply, elimination of tubercular cattle, establishment of tuberculosis wards in general hospitals, securing larger number of patients in the incipient stage for the sanatoria, follow-up of discharged sanatorium patients and improvement of the training of medical students."

EXCERPTS FROM THE FIRST PRIZE WINNING GORGAS MEMORIAL CONTEST

By Pauline Lodge, Lakewood High School, Lakewood, Ohio

Modern science has made the world, and particularly our cities, a far more convenient place in which to live than it was only a generation or two ago. The chemist, the physicist, and the engineer take a proper pride in the fact that their discoveries and inventions have facilitated travel and other forms of human activity.

If New York or any other large city were deprived of the protection of medical science its civilization would go back five hundred years. Not only would it mean inconvenience; it would be a matter of life and death for the greater part of the inhabitants of every city, large and small. The pestilences would return. Epidemics would sweep across the country, and within a decade a great part of the population would be wiped out. Yellow fever would return to Panama and would block traffic through the canal. If it should happen that the measures of preventive medicine were lost, if drinking water were no longer protected or purified, if the sanitary disposal of sewage were not practiced, and if vaccination were discontinued, every facility for rapid transportation would be equally effective for the rapid spread of disease.

The uses of inventions and discoveries of physical science would be utterly impossible without medical protection.

In spite of the fact that the benefits both of physical science and of medical science are vital to modern civilization, many people take quite different attitudes toward these two essentials. Everyone sees the advantage of the airplane or automobile, but very few people realize the dependence of civilization upon the furthering of preventive measures for diseases.

The medical sciences are today giving the world the most healthful period it has ever known, but they are not yet mature. What has already been accomplished in scientific medicine is small in comparison with future possibilities of preventing disease and prolonging human life. But there is no assurance that these possibilities will ever be realized unless each man can be taught to use preventive measures instead of waiting until the disease is upon him to have it cured.

Diseases cannot be prevented until the cause of each is discovered, and this is one of the purposes for which the Gorgas Memorial Institute of Tropical and Preventive Medicine was founded: to maintain on the Isthmus of Panama a great Laboratory for the study and research of the causes and prevention of disease, particularly tropical disease. The other purpose was the creation of a vital and worthy memorial to the great Sanitarian, William Crawford Gorgas.

General Gorgas practiced the theories of preventive medicine in his extensive work in the Tropics and as Surgeon General of our Army during the World War. He freed Havana and the Canal Zone of the menace of yellow fever by destroying the carrier of it, the mosquito. Later, during the War, he established the policy of thorough medical examination of all recruits, and periodic medical inspection of all soldiers. As a result our non-casualty death rate was below that of any other nation.

The purposes of the Gorgas Memorial Institute are purely humanitarian and scientific. Its officers and directors serve without pay, it operates without profit, and its work thus far has been wholly maintained by funds raised through popular contributions. Its organization contemplates two principal lines of operation—one, for the popularization of health and sanitary work in the United States, as a supplement to governmental health activities; and the other, for the intensive study in the Tropics of the causes and prevention of disease. The first phase is well-organized and is achieving splendid results. The other is being undertaken and financed by an appropriation from the United States Government, to which philanthropic individuals as well as the Countries of South and Central America, who will be the direct beneficiaries, are expected to add generously.

In the hearings of the bill, proposing the erection of the Laboratory, before the House Committee on Foreign Affairs, there was fully shown the great need for the establishment and maintenance, on the Isthmus of Panama, of such a research center. The economic benefits resulting from a single discovery touching the cause or prevention of a malignant or communicable disease are incalculable. This has been demonstrated in the past in the familiar cases of yellow fever, bubonic plague, and malaria. The deadly parasites of some of the tropical regions of the earth are more dangerous to man than are the savage beasts of the jungle, and proper control of the mosquito-carried diseases as well as leprosy, sleep-

(Continued on page 1068)

DIABETIC NEURITIS WITH PARALYSIS*

BY HOWARD F. ROOT, M.D.,† AND MARK H. ROGERS, M.D.†

THE pains and disabilities of the extremities of which diabetic patients frequently complain may be classified under four fairly distinct groups: first, those due to abnormal nutrition in cases of inadequately treated diabetes; second, those that show clinical evidence of the so-called diabetic neuritis; third, those referred from lesions of the spine, such as sciatic pain due to hypertrophic arthritis; and fourth, those due to arteriosclerosis and deficient blood supply.

Table I is presented as a working basis for classification of symptoms and signs, and is usable for the purposes of differential diagnosis. We might combine the cases grouped under abnormal nutrition with those classified as diabetic neuritis on the ground that both result from the same cause and merely represent different degrees of severity. We feel, however, that the presence of objective findings in the latter group, such as paralysis, indicates a very different prognosis and therefore justifies the two headings.

For the purposes of this study we have taken only those cases admitted to the New England Deaconess Hospital during the course of the year, in which an actual paralysis could be clinically demonstrated. They belong under our second heading. In Table II are summarized the general medical data.

CASE I. Hospital No. 1210. Mr. W. G. W.

Entered hospital on May 3, 1929 because of pain and weakness in the legs. He was unable to step up into an auto or street car without assistance.

The physical examination showed a loss of both knee-jerks, weak quadriceps worse on the left, and partial weakness of the anterior group of the foot muscles of the left leg.

CASE II. Hospital No. 1930. Miss M. M.

Admitted in June, 1929. The immediate cause of entrance was the gradual development of pain in the legs and increasing weakness. The pain was evidently quite severe, especially at night, so that she could not sleep. She noticed an increasing difficulty in walking, almost an unsteady gait. Getting out of a chair or walking upstairs was difficult. There had been a loss of weight and she said her legs had

TABLE I

CAUSES OF PAIN IN THE LEGS IN DIABETES MELLITUS

I. Abnormal Nutrition	II. Neuritis	III. Pressure with Referred Pain	IV. Deficient Blood Supply
Duration—Weeks to months.	Weeks to months.	Weeks to months.	Months.
Incidence—At any age.	Rare in young.	Middle age.	Rare before 50 years of age.
Character—Arms, back, as well as legs, sometimes involved. Cramps. Pain worse at night.	Distribution of pain and disturbance of sensation follows definite nerve root or peripheral nerve distribution. Pain often preventing sleep.	Sciatica is common.	Gradual onset with fatiguability of muscles of legs, paraesthesiae, then cramps on exertion. Later, pain in feet and lower legs chiefly, which may be constant, but often worse at night because of fatigue.
Cause—Inadequate treatment of diabetes.	Inadequate treatment of diabetes. Complications, such as arteriosclerosis or tuberculosis, often present.	Hypertrophic arthritis of spine. No constant relationship to D. M. treatment.	Arteriosclerosis with partial or complete obliteration of lumina of arteries.
Examination — General loss of weight and flabby muscles, active D. M. symptoms. Reflexes difficult to obtain because of weakness.	Emaciation may or may not be present. Atrophy of affected side sometimes. Absent reflexes. Paralysis (partial or complete) of such muscles as peroneal or quadriceps. Motions may or may not cause pain, according to activity of process. Hyperesthesia. Tenderness of muscles and along nerves.	Loss of weight present or absent. Tenderness along nerve. Motions of back cause pain.	Loss of weight may or may not be present. Atrophy of muscles of foot and leg on side most affected sometimes present. Foot cold and a definite level of temperature change is sometimes present. Absence of pulsation in peripheral vessels usually demonstrable. Reflexes normal.
Treatment and Prognosis—Rapid recovery with diabetic treatment, rest, physiotherapy.	Slow recovery under diabetic treatment, physiotherapy, rest, and vitamine therapy.	Slow recovery with treatment of cause, removal of strain by proper support and physiotherapy.	Improvement possible by development of collateral circulation by means of rest, circulatory exercises, and diabetic treatment, but danger of gangrene is great.

*From the New England Deaconess Hospital, Boston, Mass.
†Root—Physician New England Deaconess Hospital. Rogers—Professor of Orthopedic Surgery, New England Deaconess Hospital. For records and addresses of authors see "This Week's Issue", page 1076.

TABLE II

Case No.	Age Yrs.	Sex	Duration of Diabetes Yrs.	Admission			Blood	Gastric	Blood		Spinal Fluid*			Treatment at Discharge			
				Blood Sugar Per Cent.	Urine Sugar Per Cent.	Wassermann	Pressure	Free HCl	Hgb. %	R. B. C. Millions	Wassermann	Globulin	Total Protein Mgs.	Carbohydrate Grams	Protein Grams	Fat Grams	Calories Grams	Insulin Units
I	51	M	13.8	0.23	3.4	Neg.	150/80	35	90	5.0	Neg.	Spt.	95	112	69	107	1687	30
II	36	F	9.1	0.24	0.9	Neg.	90/60	24	—	—	Neg.	Spt.	88	120	70	140	2020	65
III	68	M	5.4	0.26	0.3	Neg.	118/75	—	—	—	—	—	—	154	75	115	1951	0
IV	59	F	4.6	0.19	0.6	Neg.	150/85	—	80	5.7	—	—	—	92	50	89	1369	36
V	59	F	0.3	0.13†	0	Neg.	130/80	—	65	4.2	—	—	—	137	69	95	1679	0
VI	58	F	6.8	0.19	3.5	Neg.	170/95	20	70	4.9	—	—	—	110	64	118	1762	20
VII	34	M	4.2	0.16	0.5	Neg.	132/80	11	85	4.6	—	—	—	122	77	118	1858	53
VIII	66	F	1.0	0.24	4.0	Neg.	130/80	22	80	6.0	—	—	—	106	52	88	1524	16
IX	60	F	6.1	0.32	4.3	Neg.	170/90	34	95	4.9	Neg.	Spt.	80	106	55	70	1274	24
X	65	F	6.6	0.33	3.3	Neg.	140/80	—	95	—	Neg.	Spt.	55	119	70	99	1647	38
XI	61	M	5.0	0.14†	0.6	Neg.	120/80	—	—	—	—	—	—	86	42	116	1556	24

*No increase in cells in any spinal fluid.
†Treatment began before admission to hospital.

grown smaller. The distribution of pain was widespread, but the knees ached most.

The examination showed flabby muscles of the legs and abdomen, especially the quadriceps. Both knee-jerks lost. Unsteady gait. Definite loss of power of both quadriceps.

CASE III. Hospital No. 4074. Mr. W. S.

About a month ago the patient fell down in his room because his left leg gave way. For some time he had had pain in his back and left leg, and on this account his doctor sent him to the hospital for study. Diabetes of five years' duration had been relatively untreated. On close questioning he had had gradual increase of general weakness. He had to urinate several times during the night, and he noticed that it was hard to get out of bed. The pain was severe enough to interrupt his sleep.

Walks with a limp of the left leg. Difficult to rise from a chair. No deformity of spine. A general loss of motion of the lumbar spine. Hips normal. Atrophy of one inch of the left thigh. Definite loss of power of left quadriceps. Knee-jerks, left absent, right normal.

CASE IV. Hospital No. 4446. Mrs. E. G. A.

Admitted on account of severe pain in the left leg, which had increased steadily for the last two months. The pain at night was as intense as during the day. She found it difficult to walk upstairs.

She walks with an unsteady gait and a limp of the left leg. Required help to get out of a chair. Location of pain chiefly just above the knee. Spine showed some restriction of motion but not in any one direction, and motion did not bring on the pain. Hip-joints normal. Atrophy of left thigh one inch. Tenderness of the muscles of the thigh. There is definite loss of power of the left quadriceps as compared with the right. No knee-jerks obtained on left, sluggish on right. X-ray of spine shows some hypertrophic changes.

CASE V. Hospital No. 7172. Mrs. C. D.

In June, 1928 the patient developed severe pain in the right lower back, hip, and thigh, for which she was admitted to another hospital and diabetes was there discovered. She was discharged when the sugar was under control. The pain subsided, but she noticed a lameness of the right leg so that walking was difficult.

Spine normal. Hips normal. Ten degrees permanent flexion of the right knee. Knee-jerks, sluggish on right, normal on left. The right foot can be dorsiflexed to right angle only. There is definite loss of power of the anterior group of the right foot. Sensation of numbness of the right lower leg. On walking there is a definite foot-drop.

CASE VI. Hospital No. 7563. Mrs. Z. M.

Admitted in January, 1929, on account of severe pain in the legs of four months' duration. She noticed increasing difficulty in walking, and finally could walk only with help. At first the pain was more severe in the right leg, but then the left became more painful. The pain is better, but the weakness is more marked.

She walks with a definite toe-drop of both feet. Spine and hip-joints are normal. Quadriceps normal. Both knee-jerks are absent. The anterior group of muscles of the foot are paralyzed on the left and weak on the right.

CASE VII. Hospital No. 7671. Mr. R. P.

Admitted in March, 1929, complaining of pain in both legs and increasing weakness. The pain was worse at night, so that his sleep was broken. He had noticed a little unsteadiness in starting to walk and difficulty in climbing stairs.

Well-built man, of the slender type. All motions of the spine and hips are normal. Both feet showed

a rather high-arched type with contraction of the toes and anterior arch. (This was present from boyhood.) No loss of power of the foot muscles. Very definite loss of power of both quadriceps muscles. Loss of both knee-jerks.

CASE VIII. Hospital No. 7723. Mrs. M. J. C.

Entered hospital in March, 1929, on account of progressive weakness of the legs and inability to walk alone. She complained of a moderate amount of pain in both legs. The pain had been more severe two months ago.

Rather thin, elderly woman. She has great difficulty in getting out of bed and walks with help. Spine normal. Hips normal. Muscles of both legs wasted and thin. Definite loss of power of both quadriceps. She could not extend the leg or the thigh. No contractions of knee-joint. Loss of power of the anterior group of both legs, most marked on left. Anterior tibial on left not active. Knee-jerks absent.

CASE IX. Hospital No. 8145. Mrs. B.

Entered in August, 1929. She had had diabetes for some years without any treatment. About two months ago she began to develop a good deal of pain in the legs, especially at night. Gradually she had increasing difficulty in walking, and when she entered she walked on the front part of the feet, not being able to put the heels down on the floor. She was crying on account of pain.

Both Achilles' tendons contracted. Feet could not be brought to right angles. Excessive tenderness in the calf muscles. Weakness of the anterior group of both feet. Knee-jerks absent. Complete recovery reported March, 1930.

CASE X. Hospital No. 8166. Mrs. A. G. S.

The patient complained of weakness and pain in the legs especially in the calf muscles; also of a peculiar numb feeling in the legs. It was quite difficult for her to walk alone, which at first was thought to be due to general weakness. On walking there was an unsteady gait so that she required help.

The physical examination showed loss of both knee-jerks. Tenderness of the calf-muscles. Definite weakness of both quadriceps.

CASE XI. Hospital No. 8255. Mr. M. J. F.

The patient was admitted in March, 1929 on account of lameness and inability to continue his work. This required the driving of an automobile and he found that he was not able to get in and out with comfort. For two months he had had severe pain, but he thinks this is improved.

A well-built man. On walking he was somewhat unsteady and placed his left leg carefully before he began to walk. Spine negative. Hips negative. One inch atrophy of the left thigh. Definite weakness of left quadriceps. Knee-jerks, absent on left, slight on right.

The series includes seven females and four males. As a group the average age is 58 years, but it will be noted that one male and one female were 34 and 36 years. The duration of the diabetes was, on the average, 5.1 years. In the one case where the duration was estimated at less than one year the patient could give no satisfactory idea of the onset. The diabetes was discovered by chance in the hospital and, since it is our rule to underestimate rather than overestimate duration, in this case, as in most, it was really much longer than that given. The data as to arteriosclerosis are not very definite. In all but two cases, apparently there were thickened radial arteries. Considering their ages and the duration of the diabetes in these patients, it may safely be assumed that arteriosclerosis was present in moderate to advanced degrees in nearly all; in fact, x-rays showed calcification in the vessels of the legs or pelves in all but two cases. The Wassermann reactions in the blood were negative in all cases and in the spinal fluid, negative in the four cases in which it was tested. In all cases the sugar was abnormally high with the exception of Cases V and XI, where the blood sugars were but 0.13 and 0.14 per cent. These were elderly patients, one of whom, Case No. V, proved to have the disease mildly enough to be discharged without insulin, and the other, Case No. XI, required 24 units of insulin a day. Anemia and achlorhydria did not appear to be factors in the cases in which the examinations were made, unless Case V be so considered. Hypertension exceeding 150 m.m. systolic was present in three instances, but in one other the blood pressure had been above 150 at other times. The diets prescribed at discharge from the hospital with the insulin dosage show that only two cases received less than one hundred grams of carbohydrate. Cod liver oil, fresh liver and liver extract, yeast concentrate with an abundance of fruit and green vegetables were prescribed to assure sufficient vitamins in the diet.

Symptoms. Pain is the most pronounced symptom of this group. It was on account of pain, and less often on account of lameness, that they entered the hospital. It was noted that if a careful history of the development of the pain element was made, there was often pain in the lumbar region at first, but soon this symptom was prominent in the legs. This, together with the fact that in four cases globulin and an increase in the total protein of the spinal fluid was found, suggests that the pathology of this condition is located in the spinal cord or nerve roots, as well as in the peripheral nerves. The pain is not confined to the course of one nerve trunk. The distribution is very variable, sometimes in the calf of the leg and very often in the anterior portion of the thigh. It has not the same clear-cut distribution as seen in sciatica. Pain at night is the rule; all patients complained of its being of such severity that they were worn out because of loss of sleep. It evidently is not brought on by any movement in bed, rather they are restless and want to change position frequently.

Some patients have complained of certain paresthesiae, such as numbness and tingling in the legs. One of them also complained of the same sensory changes in the arms and hands, although we have only seen two cases that showed loss of muscular power as is seen in the legs. All the cases show loss or diminution of knee-jerks, either on one side or both. If it is one-sided, then it is always on the side that shows paralysis of a group of muscles.

Examination. In examining a patient for the determination of weakness or paralysis of any

group of muscles, it is necessary to take advantage of all the methods that are familiar to an orthopedic surgeon, and to follow the same methods that are used in examining for infantile paralysis. We have seen a definite paralysis overlooked by the staff because the patient was seen in bed only. The condition has been recognized by well-trained nurses, who have called our attention to the way the patient gets out of bed or arises from a chair. There may be a definite loss of power of the quadriceps that is hard to detect in bed, which will be perfectly evident if the patient is sitting in a chair and tries to get up, or if he attempts to go upstairs. The weakness of the quadriceps is naturally thought to be due to general weakness coincident with diabetes. It is overlooked in contrast to the well-known peroneal type of paralysis, which cannot be missed. The definite toe-drop gait is characteristic, and on examination, as compared with the opposite leg, it is evident that the patient has lost the power of dorsiflexion, with a paralysis of the extensors of the foot. Even a slight loss of power in this case is evident, and this type of paralysis has been well recognized for years. It is our experience that those cases that show paralysis of other muscles, such as the quadriceps group, have not been readily diagnosed and we believe are not recognized. In Case III the complaint was chiefly of pain, and it was only after more questioning that the patient stated that he was not able to go upstairs. Then it was noticed that the power of the quadriceps was diminished one-half.

No patient in this series showed paralysis to the extent that walking was impossible, but we have seen an occasional patient where the paralysis was so complete that he was confined to bed. In one of the severest cases that was seen, some years ago, the patient was unable to use both legs for a period of six months, and it was a year before she was able to walk without braces and crutches. Finally, she made a complete recovery.

Diagnosis. In analyzing the symptoms of this group, the most important is pain, fairly typical in character, varying in its intensity in each case, but sufficiently characteristic so that the condition can be suspected from the history. In all cases there is loss of knee-reflexes, and the degree of loss is equal to the amount of muscular weakness. Sometimes it is unilateral and the paralysis is on that side. The frequently observed atrophy of the muscles depends on the amount of paralysis and the duration of the symptoms. The unsteadiness of gait and physical disability depend, after the pain has disappeared, on the amount of muscle loss. Pain, unaccompanied by motor weakness, areflexia or objective sensory loss, is an early stage, which we have ascribed to the abnormal nutrition of inadequately treated diabetes, because it occurs even in children. When objective findings are present we must distinguish the condition from lesions due to lues, arthritis of the spine, pernicious anemia or rarer conditions such as tumor of the spinal cord. The cerebrospinal fluid, not only in 4 cases here reported, but in 4 subsequent cases, has been water-clear, normal in cell count, but has contained excess of protein as indicated by qualitative globulin tests and quantitative determinations of the total protein.

Etiology. These cases as a group represent the results of imperfect diabetic treatment. Similarly, in the cases of neuritis characterized by pain and areflexia, but without motor paralysis, reported by Woltman and Wilder[1], the same evidence of uncontrolled and active diabetes is apparent. Although their patients had no acidosis and were not emaciated, they entered the Mayo Clinic with large amounts of sugar in the blood and urine, and with histories of losses of weight up to 73 pounds. The average loss of weight in our group was 40 pounds. Our Case II is a marked example of this irregularity of diabetic treatment and also is one of the cases in which there was great disability and very slow recovery. It is true that once in the hospital these patients can be easily brought under diabetic control, but evidently the damage has been due to an accumulation of effects rather than any recent injury. There can be no doubt that age and vascular disease make fertile soil, but we feel that diabetes produces, directly or indirectly, some specific effect.

It is an interesting speculation to consider this a nutritional or deficiency state and to compare it with such conditions as beri-beri, pellagra, and possibly pernicious anemia. It is clinically somewhat similar to the description of beriberi, and although we have only seen two of these cases, we believe that there are points of resemblance, as, for example, the occurrence of edema. A case of multiple neuritis with edema in a young woman, reported by one of us[2] made a rapid recovery from double wrist and toe drop under diabetic treatment before the discovery of insulin. Uncontrolled diabetes may interfere with the normal utilization of vitamine, notably vitamine B, so that a deficiency state is produced. We have not seen such ataxia with spasticity as is seen in pernicious anemia, but some of the cases have ataxia, which is due in diabetes to weakness rather than sensory changes. Yet there is evidence in these cases of sensory changes as well as motor. The fact that improvement always occurs with adequate treatment, the rate and the degree depending upon the duration of neuropathic symptoms and their severity, suggests that the condition is due to toxic effects upon the spinal cord or peripheral nerves. When organic changes are present, such as arteriosclerosis, this effect is more easily produced and conceivably may lead to organic degenerative changes from which complete recovery is impossible.

Through the kindness of Dr. Hyman Morrison of the Beth Israel Hospital, Boston, we have seen the complete record of a patient of his who

undoubtedly corresponds to this group and who died of pneumonia, while she showed evidence of paralysis. We did not see the patient. A complete autopsy was done and the lumbar cord showed definite changes, which were not of an inflammatory nature. The following is a transcript from the autopsy report of that portion involving the cord:

"Lumbar and thoracic cord. Most striking change—numerous small corpora amylacea present. Most numerous in the dorsal part of the cord and are found not only in the white and grey matter, but also in the overlying meninges. There is a slight diffuse gliosis of the dorsal columns, but no large areas in which the nerve fibers are deficient are found anywhere. This change is found both in the lumbar and thoracic portions of the cord. The grey matter shows nothing unusual, the nerve cells not being rounded off and the Nissl's granules staining well."

This case perhaps belongs with cases reported in the literature with degenerative changes in the cord in diabetes. The increase in total protein of the cerebrospinal fluid in our cases is to be noted. The essential finding in Dr. Morrison's case is the gliosis of the dorsal columns. Woltman and Wilder found in their cases sclerosis of vessels in the nerve trunks and areas of degeneration in the nerve tissue. They summarize the conclusions of other authors regarding the pathologic lesions under the following headings:

1. Peripheral neuritis.
2. Degeneration of posterior spinal nerve roots (pluriradiculitis).
3. Degenerative changes in the cord similar to the changes found in pernicious anemia.

Treatment. The essential point of departure in the treatment of this condition is a most careful survey of the medical and dietary problem. The mild cases improve rather rapidly in proportion to proper diabetic care. We are sure that rather intensive physiotherapy in the form of baking, warmth at night, and light massage is a definite help in controlling the pain. This heat should be applied not only to the extremities, but also to the lumbar spine.

Absolute rest in bed is essential in the early stages of pain. In Case IX the patient before entering the hospital, had been trying to do her own work for a month when she was hardly able to walk, and it was only when she was kept in bed with complete relaxation of the muscles, that the pain was brought under control. There should not be much attempt at use while the pain element is prominent. The prognosis, so far as pain is concerned, is good under these conditions, but the duration is uncertain. Although most of the cases make definite improvement in a week, a few have been persistent for six months to a year.

In the cases of toe-drop with paralysis of the anterior group of muscles a brace attached to the shoe to hold the foot at right angles is required. This should be worn until there is a complete recovery of the muscles. We have seen two cases of paralysis of the quadriceps in which a caliper splint was needed in accordance with orthopedic treatment, but as a rule it is not necessary.

Prognosis. In general, improvement begins as soon as treatment is started. The rapidity of this improvement is dependent largely on the length of time the process has lasted and the changes that have already taken place as indicated by the paralysis. In one severe case of years past, where there was absolute loss of power, it took one year before there was fairly normal muscular function. We believe the average patient with paralysis will require a period of three months for recovery.

SUMMARY AND CONCLUSIONS

1. Eleven cases of diabetic "neuritis" with motor paralysis as well as sensory symptoms are reported.
2. A classification of the common cause of pain in the legs of diabetics is given.
3. Diabetes exerts some specific toxic effect upon the spinal cord or peripheral nerves dependent primarily upon the abnormal nutrition of inadequately controlled stages of the disease, but favored by the degenerative changes consequent upon advancing years and vascular disease.
4. An increase in the total protein of the cerebrospinal fluid was observed in 4 cases.
5. Treatment is successful and prognosis is ultimately good.
6. Diabetes should be suspected in cases of obscure pain and paralysis of the legs just as it is in the presence of gangrene, furunculosis, or the classical symptoms of the disease.

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THE HINTON GLYCEROL CHOLESTEROL REACTION FOR SYPHILIS*

Second Modification

BY WM. A. HINTON, M.D.,† AND ARTHUR BERK, M.D.†

In April 1929 one of us published, with Stuart, modifications in the technic of the Hinton tests for syphilis[1]. Since then investigations have been conducted to determine the efficacy in the test of approximately one hundred and fifty different cholesterinized lipoidal extracts. For a specific precipitating reaction with syphilitic serums, we compared extracts made from uterine muscle of cows, beef heart and beefsteak obtained from adult cattle and from veal of the same cut. The extract from beef heart gave the best results. But far more important than this specific precipitating effect was the presence of a characteristic ring, which, under the conditions to be described was a still more sensitive and equally accurate sign of syphilitic serum. For a specific agglutinating reaction the extract of voluntary striated beef muscle (round steak) proved, as before, to be the best.

The result of this work is a test as simple, and as easy to read as the original one, but more sensitive and dependable. It is composed of the original method slightly modified and a supplementary procedure. Before beginning our description of this test, we wish to stress the importance of strict adherence to minutiae upon which depends the acquirement of a precise and invariable technic—a necessity for good results. We have been made to realize this by many inquiries concerning the previously published technic of the Hinton test and by the following experience which illustrates the importance of a minute detail. In one laboratory a reagent was added either by pouring from cylinder to flask or by delivering to a flask with a 10 c.c. pipette, depending usually upon the amount of the indicator to be made. The method of mixing, therefore, was variable. The results at times were excellent, at other times confusing, and in rare instances very poor. In another laboratory the same reagent was always added by using 10 c.c. pipettes, the delivery rates of which were approximately the same. In the latter laboratory the results were excellent and remarkably constant.

We shall proceed to give a list of equipment and the directions for the test as it is now performed.

EQUIPMENT

(1) Test tube racks holding 40 to 160 tubes in multiples of 10 or 20 in a row.

(2) Small test tubes 10 m.m. in diameter and 100 m.m. long, commonly called serum tubes. The diameter of the tubes should be approximately uniform. Incorrect results may occur with the use of larger or smaller tubes.

(3) An inactivating water bath kept at 55° C.

(4) An accurately standardized maximum and minimum thermometer to be used in conjunction with the standard bath thermometer. Check the accuracy of the former with the latter.

(5) A Wassermann bath, kept at 37° C. or a degree lower. Change the water in the bath frequently to avoid a dirty deposit on the outside of the tubes which makes reading difficult.

(6) Graduated cylinders of 100 c.c. and 250 c.c. capacity for measuring the reagents.

(7) Pipettes of 2 c.c. capacity, graduated in tenths to the tip for measuring the serums; and 5 or 10 c.c. serologic pipettes for mixing the indicators.

(8) Thick-walled Erlenmeyer flasks of 500 c.c. capacity, for mixing the glycerinated indicators.

PREPARATION OF REAGENTS

(1) Cholesterinized Muscle Extract referred to in previous publications as stock indicator, prepared as originally: Remove fat and connective tissue from round beefsteak (adult animals only), grind fine, and dry in a large flat uncovered dish at 56° C. until weight is constant which usually requires 4 to 5 days. Pulverize the dried muscle tissue with a meat grinder, using the machine's finest disc. Extract by placing 100 gm. of the powdered tissue with 400 c.c. of ether (for anesthesia) in a glass-stoppered bottle and shaking thoroughly by hand for 10 minutes. Allow to settle, pour off and discard the ether. Make 4 or more separate extractions, using 400 c.c. of ether for each. The process is complete when the last extract is colorless. Remove the ether by filtration and dry the residue, containing the ether-insoluble constituents, on the filter paper. Weigh this dried residue and extract in a glass-stoppered bottle with 95 per cent. ethyl alcohol, in the proportion of one gm. of the dried residue to 5 c.c. of ethyl alcohol, for 3 days at 17° to 20° C. (room temperature). Filter to remove the tissue and mix one part of this clear alcoholic extract with 9 parts of a 0.7 per cent. solution of cholesterol in absolute ethyl alcohol in a colorless glass-stoppered bottle. Adjustment (or titration) of this cholesterinized muscle extract is unnecessary. Fourteen such extracts made in the above manner have given practically identical results.

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This extract and the Cholesterinized Heart Extract, the description of which follows, keep indefinitely in colorless glass-stoppered bottles at 15° to 20° C. Chilling will cause the cholesterol to precipitate. Frequent removal of the indicator will cause a deposit of cholesterol and extract to accumulate on the mouth of the bottle which gives rise to a rancid odor. This deposit should be wiped off with clean gauze whenever it accumulates. We place a month's supply of this indicator in a small bottle in order to avoid a possible accidental contamination of a large quantity.

(2) A Cholesterinized Heart Extract*, for use in the supplementary procedure, prepared as follows: Extract dried ground beef heart muscle (Digestive Ferments Company)† by placing 100 gm. of the powder with 400 c.c. of ether (for anesthesia) in a glass-stoppered bottle and shaking thoroughly by hand for 10 minutes. Allow to settle, pour off and discard the ether. Make 4 or more separate extractions, using 400 c.c. of ether for each. The process is complete when the last extract is colorless. Remove the ether by filtration and dry the residue, containing the ether-insoluble constituents, on the filter paper. Weigh this dried residue and extract in a glass-stoppered bottle with 95 per cent. ethyl alcohol, in the proportion of one gm. of the dried residue to 5 c.c. of the alcohol, for 3 days at 17° to 20° C. (room temperature). Filter to remove the tissue and add 0.2 gm. of cholesterol to each 100 c.c. of extract. Cholesterol obtained from Merck and from the Digestive Ferments Company, when compared, gave identical results. Very rarely a cholesterinized heart extract prepared in strict accordance with these directions is too insensitive, even though made from a ground powder which has yielded excellent extracts on previous occasions. The reason for such failure is not clear to us. The detection of this insensitiveness will be discussed later.

(3) A 5 per cent. solution of sodium chloride (C. P.) in distilled water.

(4) A 50 per cent. solution of glycerol (Baker & Adamson C. P.) in distilled water.

For convenience several liters of the sodium chloride solution and the 50 per cent. glycerol solution may be made up at one time, as they keep indefinitely.

*The method of preparing the cholesterinized heart extract is practically that of Neymann and Gager[2], used by them in the Wassermann reaction and by Kahn[3] and others in their precipitation tests. The method of extraction itself was first applied by Erlandsen[4] to a study of heart muscle without reference to the Wassermann or other serum reactions for syphilis.

†We wish to thank the Digestive Ferments Company of Detroit, Michigan, U. S. A., to whom we are indebted for the dried beef heart muscle used in this investigation. Eight different preparations were used. The first four preparations had been kept at room temperature, in the bacteriological laboratory of the Digestive Ferments Company, for eighteen, twenty-three, twenty-five and thirty-eight months, respectively, before being sent to us for testing. The remaining four preparations had been kept in the refrigerator, 18-20 degrees Fahrenheit, in the bacteriological laboratory of the Digestive Ferments Company, for three, eight, eighteen and twenty-three months, respectively, before being sent to us for testing. There has been no evidence of deterioration in any of these preparations, equally satisfactory indicators having been made from each.

TECHNIC OF THE TEST

(1) Separate each serum from its clot with a long dropping pipette, which should be *thoroughly* rinsed with physiological salt solution after each serum to avoid the contamination of one serum with another. Heat the serums in the inactivating bath at 55° C. for one-half hour. Extreme care should be taken to keep the bath at 55° C. throughout the entire period of inactivation, as erroneous results may be obtained when the temperature falls even one or two degrees below this point. Inactivation at a temperature above 56° C. will decrease the strength of the reactions. Furthermore, it is preferable to inactivate just before testing, as serums kept for several days, and even for a day, occasionally give negative or weak reactions, whereas if tested a few hours after separation from the clot they would be strongly positive. Should it be necessary to retest a specimen, always use serum freshly separated from the clot rather than that which has been inactivated 24 hours previously. It is well to use several strongly positive and negative control serums particularly if only a few tests are to be made.

(2) Place 4 serum tubes (10 mm. x 100 mm.) in a row for each specimen to be tested. Inspect each tube before use to be sure that it is clear and chemically clean. To clean the tubes, fill them with a warm solution of one part sodium hydroxide in 1000 parts of tap water, allow to stand for about 2 hours, and wash THOROUGHLY with hot water to remove the alkali and then dry. This process will completely remove any deposit of cholesterol which may have remained from previous use. Boiling in this caustic solution will corrode the tubes.

(3) With a 2 c.c. pipette graduated in one tenths to the tip, pipette into the first tube 0.3 c.c. of serum, into the second tube 0.5 c.c., into the third 0.3 c.c., and into the fourth 0.5 c.c. Use a clean dry pipette for each serum to be tested.

(4) Prepare Glycerinated Muscle Indicator as follows, adhering precisely to the directions, for incorrect mixing will lead to inaccurate results. Calculate the amount of glycerinated indicator needed for the number of tests to be done; sufficient indicator can be made from 1.0 c.c. of the cholesterinized extract for 30 serums. Pipette 1.0 c.c. (one part) of Cholesterinized Muscle Extract into an Erlenmeyer flask. With a 10 c.c. pipette, add 2.0 c.c. (2 parts) of the 5 per cent. solution of sodium chloride at one time, and shake thoroughly for 3 minutes. Add 12.0 c.c. (12 parts) of the 5 per cent. solution of sodium chloride, measured in a graduate, and shake thoroughly. Add 15.0 c.c. (15 parts) of the 50 per cent. solution of glycerol from a graduate and mix the whole well. Of course any multiples of the above can be prepared. The density of the completed indicator should be equal to that of a barium sulphate standard prepared in the following manner: Suspend 2

grams of pure barium sulphate powder in 100 c.c. of distilled water. Shake the suspension, and *immediately* add 0.5 c.c. of the suspension to 3 c.c. of the 50% glycerine solution in one of the test tubes used in the test itself. Add a few small glass beads to facilitate mixing, and mix. This standard may be kept in a sealed test tube indefinitely. As the barium sulphate settles to the bottom of the tube on standing, it should be shaken thoroughly before each comparison. A sample of the glycerinated muscle indicator should be poured into a tube of the same diameter as that containing the standard and compared with it. An indicator of less density has probably been prepared incorrectly, and should not be used.

(5) With a 10 c.c. pipette, add 0.5 c.c. of the above glycerinated muscle indicator to the first two tubes.

(6) Prepare Glycerinated Heart Indicator as follows, adhering precisely to the directions for mixing. The accuracy of the test depends very much on this because incorrect mixing may result in an atypical ring on all of the tubes containing negative serums.

For the preparation of 30 c.c. of the glycerinated indicator, pipette 0.8 c.c. of the 5% sodium chloride solution into an Erlenmeyer flask of 500 c.c. capacity. With a clean, dry pipette, add 1 c.c. of the cholesterinized heart extract allowing it to flow directly into the salt solution. A more opalescent and less turbid indicator may result if the extract is allowed to run slowly down the side of the flask. A wide bottom flask of this size is necessary in order to insure a sufficiently large surface for the proper mixing of the cholesterinized extract with the salt solution. Shake the flask thoroughly for at least one minute, and let the mixture stand five minutes. A shorter period of standing causes a less turbid indicator which is also less sensitive. The maximum degree of turbidity is apparently attained by delaying five minutes, since standing ten, twenty or thirty minutes produces no greater turbidity nor sensitiveness. Next add 13.2 c.c. of the 5% sodium chloride solution and shake thoroughly. Fifteen cubic centimeters of 50% glycerine are finally added and the whole is mixed well. This is the smallest amount of glycerinated heart indicator which can be mixed satisfactorily at one time. Thirty to 150 c.c. of the glycerinated indicator may be prepared at one operation. Should more than 150 c.c. of glycerinated indicator be required, prepare amounts utilizing 5 c.c. or less of the cholesterinized extract, and pool the resulting indicators for use. In this way, a suspension of the maximum turbidity with the concentration of cholesterol employed is obtained which should correspond in density to the barium sulphate standard if the two are compared in test tubes of equal diameter. Prepare the standard as described previously in connection with the muscle indicator. Since the barium sulphate suspension is somewhat different in appearance from the Glycerinated Heart Indicator, a comparison of density can be made most satisfactorily by standing or sitting with the back toward the light and looking through the two test tubes at some mark, such as a pencil line drawn on a piece of white paper. The line should be seen with equal distinctness through both the standard tube and that containing the Heart Indicator. It is important to make this comparison each time, since a very minor fault in mixing may result in an indicator of less turbidity, which will cause difficulty in reading the test and which, furthermore, will be less sensitive. After a trial of many methods over a period of several months, the method of mixing described above was chosen because it gave us the most uniform results. The use of 0.8 part of salt solution to 1 part of the cholesterinized extract is optimum for most glycerinated heart indicators. If this proportion produces rings (to be described later) with negative serums, the amount of salt solution should be increased to more than 0.8 c.c. per 1 c.c. of extract. On the other hand if negative reactions are obtained with serums from syphilitics, the ratio of salt solution to extract should be changed so that less than 0.8 c.c. of salt solution is used per 1 c.c. of cholesterinized extract. The maximum turbidity usually begins at one part of cholesterinized extract to 0.6 part of salt solution and ends at one part of cholesterinized extract to one part of salt solution. The proportion used should be between these limits. Because of this occasional variation, each new indicator should be tested with 100 or more known negative and positive serums as established by other tests or by clinical investigations. Whenever possible a new cholesterinized beef heart extract should be compared with an old extract of known potency in order to fix the correct proportion for mixing, but once determined no further testing is required for the particular extract.

(7) With a clean, dry 10 c.c. pipette add 0.5 c.c. of the above glycerinated heart indicator to the third and fourth tubes.

(8) Shake the rack by first inclining it so that the tubes are almost horizontal and then thrusting it quickly backward and forward. The first motion is as if one wished to throw the tubes from the rack. By repeating 10 times, one obtains a quick but thorough mixture of the serum with the glycerinated indicator. The presence of small bubbles at the surface of the fluid in many of the tubes is the only safe criterion of adequate mixing, which is important.

(9) Note the temperature of the bath as indicated by the bath thermometer and rectify it if above or below 37° C. Adjust the maximum and minimum thermometer in the bath. If the temperature rises above 37° C. the tests with the glycerinated muscle indicator (tubes 1 and

2) may be very granular (to be described later), but unless the temperature exceeds 40° C. there will be no unfavorable effect on the tests containing the glycerinated heart indicator. Temperatures as low as 33° to 34° C. result in reactions, in which a relatively large number of tests give stronger reactions with 0.3 c.c. of serum than with 0.5 c.c. of serum.

(10) Place the rack containing the tubes in the Wassermann bath at 37° C. and let it remain for 16 hours (conveniently from 5 P. M. to 9 A. M.). Do not disturb the contents of the tubes before reading.

(11) At the time of removing the tests from the bath, note and record the temperature readings shown by the regular bath thermometer and by the maximum and minimum thermometer.

READING THE TEST

The results may be read immediately. However, the characteristic ring with the beef heart indicator is intensified by standing in a refrigerator, while no visible change occurs in the tubes containing the muscle indicator. Therefore, in order to facilitate the readings in the second two tubes, the racks should be placed carefully, without shaking, in the refrigerator and allowed to remain there one hour. After taking out of the refrigerator, allow to stand only long enough for the water of condensation on the outside of the tubes to evaporate. If for any reason the tests cannot be read promptly the time of standing in the refrigerator may be extended to 3 hours. It is extremely important to read the tests with accuracy. *This requires a precise procedure and judgment based on experience.* In practice, we read and record the readings for the four tubes at one time, but for the purpose of description here we are separating the methods of reading and recording according to the indicator.

(1) To read the tests in the first two tubes (containing glycerinated muscle indicator), sit in front of and facing a window, lift the tubes carefully from the rack with one hand, raise to the level of the eyes, and read and record the changes in each tube. Neither opalescence occasionally encountered in serums nor hemolysis, unless marked, affects the accuracy of the tests with this indicator. A few serums give stronger reactions with 0.3 c.c. of serum than with 0.5 c.c., but regardless of this the strength of the reaction as a whole determines the interpretation.

(2) To read the tests in the last 2 tubes (containing glycerinated heart indicator), sit in front of a window, but not in the direct sunlight. Lift the tubes carefully from the rack with one hand, hold them at the level of the eyes and look in the direction of a darkened background, either on the right or left hand

CHANGES OBSERVED WITH GLYCERINATED MUSCLE INDICATOR
(First 2 tubes)

	To Be Read	To Be Recorded
Negative reactions		
(1) No visible change or	Minus	—
(2) Clearing of fluid resulting in granularity but no definite agglutination of cholesterol	Minus	—
Positive reactions		
These show definite agglutination of cholesterol and are divided into four types:		
(1) Incomplete clearing with small clumps	Weak	W
(2) Complete clearing with small clumps	Weak	W
(3) Complete clearing with moderate clumps	Moderate	M
(4) Complete clearing with large clumps	Strong	S

CHANGES OBSERVED WITH GLYCERINATED HEART INDICATOR
(Last 2 tubes)

	To Be Read	To Be Recorded
Negative Reactions		
(1) No visible change or	Minus	—
(2) A fine granular scum on top of fluid with no flakes. This does not occur when the indicator is properly prepared.	Minus	—
Positive Reactions		
(1) A flaky ring, approximately 0.2 m.m. to 1.5 m.m. wide, slightly to moderately, but not strongly, adherent to inside of tube, accompanied by:		
(a) Complete clearing of fluid and large agglutinated masses of cholesterol. Shaking causes ring to disappear but a precipitate remains.	A (Agglutinate)	A
(b) Partial to complete clearing but no definite agglutinated masses, with a fine but definite precipitate which remains after shaking.	P (Precipitate)	P
(c) Scarcely any visible change in clearing and no precipitate observed after shaking.	R (Ring)	R
(2) No ring, but a definite precipitate on shaking. It is recorded like (b) above, as if a ring were present. This is rare.	P (Precipitate)	P

side of the window. Note any clearing of the fluid or a pronounced ring adherent to the tube and at the top of the meniscus of the fluid. Incline the tubes to an angle of 45 degrees, and note any ring which may not have been observed before. At the same angle gently rotate both tubes by rolling them between the fingers, and again look for a ring. To be significant, a ring must be only slightly adherent to the inside of the tube and must possess fine flakes which have a tendency to "creep" up the inside of the tube in a thin film when the tube is gently shaken. Such a ring must not be confused with a relatively broad band 2 to 4 m.m. wide caused by a slight, very fine, granular deposit on the inside of the tube (due to incorrect mixing of the glycerinated indicator or to an inferior heart extract). A deposit on the outside of the tube from dirty water in the bath will cause a confusing ring. A spurious ring is difficult to dislodge from the tube by shaking and may have remained from previous use (improper cleaning), or may be due rarely to a marked increase in hemoglobin in old serums. Still holding the tubes at a 45 degree angle at the level of the eyes, shake them gently once or twice and then several times, and observe any further changes. Read and record the changes in each tube.

The following summarizes the steps in the execution of the test:

1.) Separate each serum from its clot.
2.) Inactivate the serums at 55° C. for one half hour.
3.) Set up according to the following diagram:

Tube	1	2	3	4
Serum	0.3 c.c.	0.5 c.c.	0.3 c.c.	0.5 c.c.
Glycerinated Muscle Indicator	0.5 c.c.	0.5 c.c.		
Glycerinated Heart Indicator			0.5 c.c.	0.5 c.c.

4.) Shake the racks as directed.
5.) Incubate at 37° C. for 16 hours.
6.) Place in refrigerator for 1 hour.
7.) Read results.

INTERPRETATION OF THE READINGS

(1) Where no significant change occurs and each tube is read "Minus", interpret the test as negative, as illustrated in the column headed "Report" in the table below.

(2) Where any significant change occurs in any one or all of the tubes, interpret the test as positive; except (a) "Weak" in only one or both of the first two tubes, and (b) "R" in only one of the last two tubes.

(3) Where "Weak" is read in one or both of the first two tubes, with no change in any of the other tubes, interpret the test as doubtful.

(4) Where "R" is read in only one of the last two tubes, with no change in any other tube, interpret the test as doubtful.

With experience, one rapidly learns to recognize the changes which have significance and the almost imperceptible ones which do not, thus simplifying the interpretation of the readings. The following table, taken from a page of our laboratory book, illustrates our method of recording and interpreting the results.

Pt's Name	Physician, Institution or Hosp. Service	Lab. No.	Hinton Readings	Report	Condition of Serum
Sawyer	Harley Hosp.	1263	————	Negative	
Jones	Harley Hosp.	1264	SSPP	Positive	
Smith	Karcher	1265	SSAA	Positive	
Powers	Smith, C. M.	1266	WWPP	Positive	
Young	Stein, L. C.	1267	——PP	Positive	
Adams	Fenway Hosp.	1268	——RR	Positive	
Stone	Fenway Hosp.	1269	—W——	Doubtful	
Davis	Greene	1270	WW——	Doubtful	
Hill	Skirball	1271	———R	Doubtful	
Brown	Skirball	1272	WM——	Positive	
Henderson	St. Mgt. Hosp.	1273	—W—P	Positive	
Grant	Cheever	1274	——R—	Doubtful	
Doherty	Blossom	1275	????	Unsatisfactory	Hemolyzed
Stuart	Boston Disp.	1276	—W—R	Positive	
Blake	Boston Disp.	1277	—WR—	Positive	

Although we have indicated the intensity of the reaction as weak, moderate, strong, or described the changes as those of agglutination, precipitation, ring formation, etc., we imply no quantitative significance by these terms. As used by us, they are purely descriptive and for our own records, for we have found that none of them has significance in therapeusis, or in diagnosis except to indicate the presence of syphilis.

DISCUSSION

Many of those who have had wide experience insist upon well-trained serologists for the execution and interpretation of serum reactions for syphilis. We do not entirely agree with them. The method which we have described has been performed with excellent results by students, by young women of less than high school training, and by physicians who have had relatively little training in serology. The re-

liability of their results has been solely dependent upon the acquirement of sufficient *experience* to enable them first, to master their technic so that it is practically invariable from day to day, and second, to recognize significant changes. In this test one must be able to distinguish true agglutination from simple granularity, and a significant ring consisting of fine flakes from a slight, but broad, cloudy deposit on the inside of a tube caused by floating cholesterol particles. One cannot expect to attain expertness in the management of even this simple test in a single trial. For one with abundant experience, daily use of the test increases accuracy in discerning the difference between positive and negative tests, so that the number of doubtful tests progressively decreases.

The test, as described, is approximately twenty-five per cent. more sensitive than the original one. The glycerinated heart indicator is usually more sensitive than the glycerinated muscle indicator. The reverse, however, occurs in a sufficient number of instances in a large series to make the use of both necessary for the best results. The increased sensitiveness has manifested itself largely in a group of treated syphilitics many of whom were inadequately treated, in latent syphilis, and in neurosyphilis. The supplementary procedure has increased the dependability of the test as a whole, for the use of two separate indicators provides a valuable means of comparison which quickly points out technical difficulties encountered in the preparation or mixing of either of the indicators. For example, should the test with one indicator become too sensitive, as compared with the other, this fact may be noted immediately, the difficulty found, and the tests repeated.

Throughout, we have insisted upon a strict adherence to a simple but definite procedure arrived at after much experimentation. We tried different concentrations of salt solution and the concentration given is that which worked best, not in a few cases, but in thousands. The same was true of different buffered solutions. We also performed many experiments with indicators of greater or lesser acidity than that possessed by our glycerinated indicators. The results were superior in isolated instances, but were distinctly inferior in a wide range of cases. After a careful clinical analysis of the cases, the amounts of serum to be used for each test were chosen which gave the largest number of positive tests in syphilitics, and less than 5 positive tests per 1000 in non-syphilitics. From our point of view the definite concentration of 0.2% of cholesterol in the cholesterinized heart extract is perhaps the most important factor in standardizing this test. After many months of study it was found that with any simple method of mixing this glycerinated indicator, a lower concentration of cholesterol was too insensitive and a higher one always resulted in confusing rings which, although not characteristic, might mislead the beginner and at times would trouble the experienced worker.

In conclusion we wish to say that attempts to shorten the method both in technique, and particularly in time, were made. These attempts have always resulted in the loss of *extreme* accuracy.

ACKNOWLEDGMENTS

We wish to express our appreciation to Dr. C. Morton Smith, Professor Emeritus of Syphilis of the Harvard Medical School, and Dr. F. M. Thurmon, Resident Physician in Syphilis at the Peter Bent Brigham Hospital, whose coöperation has been of great assistance to us. We are also grateful to Miss Genevieve O. Stuart, Assistant Bacteriologist of the Massachusetts State Wassermann Laboratory, for valuable suggestions relating to the technic of the reaction, to Miss Margaret A. Adams, who has been investigating physical effects upon the reaction, to Miss Alice Doherty, who has performed the test with unusual accuracy, to Miss Mary B. Shanahan and Mrs. Mabel J. Young, of our secretarial staff, who have worked diligently with us in our attempt to express our findings with directness and explicitness.

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EPIDERMOPHYTOSIS*

A Review of the Latest Facts and Theories

BY J. HARPER BLAISDELL, M.D.†

A SUCCESSFUL career for the American family of today is no longer the combination of financial acumen on the part of the husband, domestic skill on the part of the wife, and uninhibited mutual biologic impulses on the part of both. Even a cursory examination of the advertising pages of the larger magazines and newspapers will quickly show that fads and fancies of health consciousness are pressing hard on the heels of preventive medicine, if not really out-running it in the race for popular attention. Our next medical economic problem may well be

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to provide lay patients for the doctor rather than doctors for the laymen.

Father springs from his bed, sanctified by use in the houses of the society's elect, to his daily radio exercises. At the breakfast table he is greeted by oranges, sunkist with vitamins and coffee devitalized of caffeine. To avoid the prophesied adiposity of age he reaches for his cigarette instead of his second doughnut. On the authority of what are supposed to be the great medical minds of Europe he hopefully ingests his yeast cake that he may continue to be a man of force and vitality. Warned, by 380 physicians and 223 hospitals, that 10 million suffer in silence, he spurns inferior toilet tissue for the skin that one doesn't particularly love to touch. His scalp demands the same solution of boric acid to keep the hair of tomorrow on, that his tongue craves to keep the fur of the night before off. Mother yields to the urge for youth to sit in the glow of sunshine from the socket as she anoints the skin you do love to touch. The whole family uses the one soap found harmless, yet helpful, by 73 dermatologists. The children have their ration of the special cod liver oil that brings the health-giving sunshine from a bottle to dreary winter days. On departing for the pleasures of the evening sister is olfactorally inspected that the insidious B-O and halitosis may not relegate her to the social side-lines. As grandma parks her uppers in the nocturnal tumbler she regretfully reflects that she is a charter member of the 4 out of 5 danger-line club. And as dad prepares to retire after the day's noble experimenting with business, stock market and prohibition, he quaffs the beverage that points the drugless way to instant sleep.

And now "Athlete's Foot" has come to join the roster of the woes of mankind. "Athlete's Foot" is the trade name for Epidermophytosis, which, in turn, is the medical term for certain types of mycotic infections of the non-hairy skin. It ill behooves us to be too critical of the layman's rather appealing title, as our own medical name is equally inaccurate. Backed by age and priority, however, it bids fair to be retained in general usage.

Many years ago, Hebra was the first to describe the clinical characteristics of eczema marginatum and Sabouraud, whose name is synonymous with ringworm, showed, many years later, that this trouble is due to a special fungus termed *epidermophyton inguinale*, which is an organism similar to, but not identical with, the trichophyton which causes the classical ringworm of the scalp. In 1910 Sabouraud[1] reported 6 cases of fungus infection of the extremities which he proved by culture to be caused by the epidermophyton inguinale. In November, 1911 Sabouraud reported his observations before a special meeting of the dermatological section of the Royal Society of Medicine in London, and Whitfield, whose name has been popularized by his ointment, presented his classical description of the three types of this disease as they appear on the feet. Three years later, Dr. Marie Kaufmann-Wolf[2] of Germany made a clinical, histologic and mycologic study of 25 cases which formerly would have been accepted as dysidrosis of the hands. The first important contribution in this country was made in 1916 by Drs. Ormsby and Mitchell[3] of Chicago, who presented before the American Medical Association meeting in Detroit the case histories of 65 patients with mycotic infection, confirmed by the presence of fungi in all and cultural growth as well in many. I still have the most vivid recollection of the great interest aroused when these two gentlemen presented before the dermatological section of the American Medical Association meeting in Chicago, two years later, many cases of what was then commonly regarded as dysidrosis of the hands and demonstrated the presence of fungi in them all. The new conception of this tremendously important and common condition was very slow in permeating the general medical profession. Only ten years ago, Dr. White[4] of Boston commented on how few papers on this question had been published. He went on to say, although seven American authors had given us excellent treatises on dermatology at that time, in the form of first or later editions, it would seem that perhaps one-half of these authors wrote from hearsay, rather than from first-hand knowledge of the disease.

This state of indifference was soon changed and today we are afloat on a mycotic sea, surrounded by a fog of arguments, half-facts and theories.

In a summarizing paper of this sort it is only possible to touch on the major points of the topic, but I hope to be able to make clear to you the facts that we do know and some of the theories about which we are speculating.

CLINICAL APPEARANCES

Depending on the location on the body, and to some degree upon the type of parasite involved, the eruptions caused by these mycoses are vastly different. The classical example is, of course, *eczema marginatum* or "red-flap", which is caused principally by the epidermophyton inguinale. Even in this case the name of the fungus is a misnomer because other organisms than the epidermophyton inguinale can produce it, and also because the eruption caused by it is practically never in the inguinal region, but is located on the inner aspects of the thighs. I am sure that the eruption must be a familiar one to us all and consists of various sized areas near the genitals on the inner aspect of the thighs, which are red, sharply defined, slightly scaling and in many instances moist and oozing. In the male the scrotum is often involved, especially the left side, owing to the common practice of the men "dressing to the left". If the process is active and of long standing, it often spreads over the genitals, down over the perineum and

throughout the intergluteal fold. This same condition often involves the axillae, the under region of the breasts in women, and the umbilicus. Its appearance in these parts is practically identical with that of the thigh areas.

FEET

Three decidedly different appearances characterize mycotic invasion of the toes and feet. The commonest type is the pale, sodden, scaly, macerated appearance between the toes, especially in the fourth interspace. Associated with these symptoms occurs recurrent cracking at the bottom of the interspace, a varied amount of itching, and the intermittent appearance of vesicles at the outer edges of the involved area.

The second type is the acute vesicular eruption which comes on suddenly and has all the characteristics of an acute vesicular eczema, or the old-fashioned dysidrosis. The areas become moderately inflamed and are studded with many discrete, deeply seated, tiny, translucent vesicles. The favorite sites of these eruptions are beneath the toes and on the arch of the foot. This eruption is marked by intensive itching at times, soreness, and even complete disability, owing to the impossibility of walking on the feet. With or without treatment it has remissions, the attacks often recurring, roughly, at monthly intervals.

The third form is the hyperkeratotic type, which usually attacks the whole surface of the soles of the feet and is marked by a tremendous thickening of the horny layer, closely resembling heavy callouses of the feet. The color is often a characteristic yellow buff. In this type also there may be some vesiculation and considerable infection.

HANDS

Both the acute vesicular type and the hyperkeratotic type often appear on the hands, and the descriptions of the lesions of the feet apply in general to those of the hands. Because of the thinner horny layer of the hands all of the previously applied characteristics show a lessened degree of activity.

NAILS

Fungus invasion of the nails, either in connection with skin infection or as a separate entity, is by no means uncommon. The nails become greatly thickened, deformed and of a yellowish-brown color. As the infection progresses, there is often crumbling and a marked subungual hyperkeratosis takes place.

OTHER REGIONS THAT MAY BE INVOLVED

Intertrigo of the fingers

A moist, red, sharply defined, shiny irritation of the skin is often observed at the webbing of the fingers, especially of women who are doing considerable housework, including the preparation of vegetables and dishwashing. Curiously enough, this condition often appears in Jewish women, although why this racial characteristic is a fact is unknown. The orthodox Jews do not use soap in washing dishes and this omission may play an important part. The fungi at fault in this trouble belong to the yeast family and various observers have identified them as being different types of saccharomyces and cryptococci. Kingery and Thienes[5] have reported a severe paronychial condition, associated with maceration and vesiculation on an acute inflammatory process, with possible nail loss, occurring in a large number of cases among the workers in the fruit canneries of the Pacific coast. They have identified as the causative agents nearly a dozen different yeasts. In 1928 Drs. White and Swartz[6] of Boston reported a large series of cases in which the cryptococci were found in association with a great variety of skin eruptions in all parts of the body, which ordinarily would pass for chronic eczema. The areas involved in many of the cases were the eyelids, sides of the neck, the bends of the elbows and the backs of the knees. Some cases of pruritus ani and pruritus vulvae are due to fungus infection.

COMPLICATIONS OF FUNGUS INFECTIONS

As the result of a localized fungus infection it is possible to have a generalized eruption appear due to a systemic reaction. These eruptions are termed trichophytides. The eruption occurs chiefly on the arms and legs and occasionally on the trunk. It appears in varying forms of a moderately acute inflammation and is usually associated with marked itching throughout its duration, which is fairly short.

It has been definitely shown that this fungus may enter the blood stream and cause an eruption in other parts through direct migration, especially where the skin has been previously traumatized. In the same way it is possible for the fungi to enter the lymphatic system from a superficial infected area and cause swelling of the adjacent lymph nodes.

It has been observed that acute vesicular eruptions would break out on the hands, simulating a primary fungus infection, and in association with a more or less inactive infection of other parts of the body, as, for instance, the foot.

Examination of the hands under such conditions reveals no fungi and it is supposed that this eruption is due either to the toxins of the fungi from the foot, or to the local reaction of this organism deposited in the hands by the way of the blood stream. The action of the toxins on the skin in this way would appear to be a true allergic one.

To this group of eruptions of the hands and feet, which are known to be caused by fungi, is now added a group in which the skin appearances are in general absolutely similar, but in which it has been impossible to isolate any

fungus either by microscopic, or by cultural methods. It would appear that the etiological factor in this group is a pyogenic organism.

White[7] isolated the same species of trichophyton from the foot and the inguinal glands of a boy who presented this complication. Within a month I have seen a boy showing a typical acute mycotic infection of the left hand with tender walnut-sized glands in the axillary and epitrochlear regions, associated with a temperature of 100°, that could not be accounted for in any other way.

FUNGI IN NORMAL INDIVIDUALS

There is no question but what the vast majority of the population are harboring various fungi in the skin which are giving rise to no particular trouble. Reports of examinations of large groups have repeatedly confirmed this. At the University of Pennsylvania, some years ago, 67 out of 100 medical students had evidences of ringworm of the toes. Out of 800 patients examined as a routine in Washington, about 43% presented clinical evidence of ringworm infection. Drs. Greenwood and Rockwood[8] of Boston have this year reported the result of the examination of 100 diabetics as they were admitted to the New England Deaconess Hospital. Of the 100 patients examined, 70 gave clinical evidence of fungus infection of the feet. Out of these 70 the clinical diagnosis was confirmed by microscopic examination in 57 cases. In 24 of these cases opaque and deformed nails were examined and again 70% were positive. In discussing this paper at the meeting at which it was presented, Dr. Crutchfield of Texas stated that as a member of a commission to study the state prisons of Texas, he found that over 80% of the prisoners had fungus infection.

MICROSCOPIC AND CULTURAL FINDINGS

In view of our present-day knowledge, it is not possible to make an absolute diagnosis of epidermophytosis from the clinical appearances alone. It must be confirmed either by microscopic findings, or cultural growth of the organism. The preparation of material for examination is comparatively simple. With a dull curette scrapings are made of the edges of the lesions or from the roofs of vesicles. The material is mounted on a glass slide and if it is the intention to examine it immediately, it should be allowed to soak in a 40% caustic soda solution for 15 or 20 minutes. It is desirable in some cases to let the material soak overnight, in which case a 10% to 20% solution is used. Microscopic examination for the mycelium and the spores is first made with the low-power lens and then verified by the high-power lens. Although the mechanics of this process are simple, the report, to be of any value, especially if negative, should be from an experienced and well-qualified observer who is thoroughly familiar with what he is seeking. Growing fungi on culture material is quite a different matter and really lies within the province of the biologist, rather than the physician. Only an experienced mycologist is competent to identify the many species of trichophytons, epidermophytons and yeasts that occur in these dermatoses. As an illustration of one of the difficulties of this work, any change in the composition of the culture material may result in an entirely different type of growth on the part of many of these species. Standard medias and standard growing conditions are essential for the comparison and identifications of species grown by different observers.

It must be borne in mind that if the individual patient has been using any of the fungicides, the microscopic examination will be falsely negative and cultural growth cannot be attained for many weeks.

TREATMENT

A great many things have been recommended for the treatment of epidermophytosis and, as usual, when no one treatment is specific, all are more or less unsatisfactory. The underlying principle of treatment is to remove the horny layer of the skin to such an extent that the fungus-killing drugs may come in direct contact with them. Thymol, salicylic acid, resorcin, chrysarobin, potassium permanganate, crude coal tar, tincture of iodine, and mercurochrome have all proved to be of use in these conditions. X-ray has been found useful also by some observers, but usually in conjunction with the employment of local application. Personally, I employ a 1 to 5000 potassium permanganate solution with advantage to the acute vesicular type and a 6% salicylic acid and sulphur ointment in many of the other phases of the disease. Treatment of the thick infected nails is absolutely hopeless in my experience. The latest method of treatment which is receiving very favorable consideration is the inhalation of ethyl iodide. This procedure originated with Dr. J. H. Swartz[9] of Boston. It consists of the daily inhalation of about 1 c.c. of ethyl iodide through an inhalation apparatus which permits the mixing of this volatile substance with air. He has recently reported some 25 cases of mycotic infections of all types and of all areas, the majority of which have shown marked improvement after treatment. The treatments are given every other day, or daily, and the improvement begins after the first four or five are given. Some of the cases received as many as 16 treatments.

SOURCES OF INFECTION

One of the first questions that the patient always asks is, "Where did I get this, Doctor?" and in view of the almost universal distribution of this organism, it is fair to say that he may have picked it up almost anywhere. There is no question, however, but what certain types of exposure predispose towards acquiring this disease. Favored by warmth and moisture, it is unques-

tionably prevalent in public showers, gymnasiums and swimming pools. At the University of California 1600 out of 3000 freshmen showed evidence of ringworm. The girls at the University had a new gymnasium with sunny floors and they were never permitted to walk barefoot on them. The boys, on the other hand, had a gymnasium which was described as being "a dark, steamy wet place," on which they went about unrestricted. At the end of the year reexamination showed that ringworm had increased 24% among the boys and only 2% among the girls. Leather gloves, woolen stockings, leather street car straps, dirty athletic clothes in dark lockers are unquestionable sources of infection. Personally, I feel that public hand rails, door knobs and glass door plates may well join the incriminated list. I can hardly see how one can avoid infection if he runs downstairs, firmly grasping a hand rail in which his predecessor has just squeezed the serum and epithelial debris from an active palmar process. It is even within the realm of possibility that the customary handshake may become taboo and the old Roman arm grasp or the nose rub of the savage be revived.

EPIDERMOPHYTOSIS AS AN INDUSTRIAL DISEASE

Epidermophytosis is an infection the acquisition of which is one of the common risks of existence and as such its relation to industry and compensation for industrial disability would seem to be remote. This, however, is far from being the case. In this Commonwealth the law provides that the worker is entitled to his compensation not only for the primary disability, but also for the secondary complications arising from it. Generally speaking, this is interpreted to mean that a primary fungus infection is not compensable, that being considered an illness common to ordinary existence, but a fungus infection shortly following a previous industrial dermatitis venenata or eczema is compensable on the basis that it is a sequela of a condition arising from the worker's employment.

The difficulties of rendering fair and definite judgment in cases of this type can be illustrated best by the consideration of a few typical case histories.

C. D., aged 40, a baker, presented a case that was most difficult to pass judgment upon. His place of employment was a small bakery and in the course of his work he handled flour, sugar, chocolate, etc., all substances that are capable of producing irritation on the hands. At the time that he came for observation he said that he had had varying degrees of dermatitis on the palms for a year. For the past month he had not worked and the condition had not improved. On examination he showed a mild fungus infection of the palms and fingers.

The questions to be answered in this case are: Has this man had a primary fungus infection of a year's duration? If so, he is not entitled to compensation. Did his dermatitis start as a result of the irritation from the materials with which he worked and did such irritation open his skin to the fungus infection which he now has? If such is the finding, he is entitled to compensation as long as the disability lasts. In a case of this sort it is obvious that a conclusive judgment is impossible.

E. F., aged 30, was a worker in a dye-house. On his first visit he showed an acute dermatitis of the hands of three weeks' duration. Under proper treatment this acute phase subsided bringing to view an underlying fungus process.

In view of the fact that the man had worked with irritating substances for many months without harm and because the present trouble was of a very short duration it was ruled that the fungus infection was primary and not related to his employment. Obviously such a finding was very unpopular with the employee. This case raises the point of how large a point of injury to the skin is necessary to act as a portal of entry for the infection. It was contended by the attorney representing this patient that the dyes produced a tiny point of injury which was not noticed and that the infection occurred here. It was, of course, equally true that such a minute injury to the skin could have been equally well received at any time other than during his working periods.

G. H. 50 years old, was a painter who had suffered from a five months' disability from eczema of the hands, forearms and lower legs, which was undoubtedly due to the materials with which he came in contact. Following the five-month period he was completely well for three months and then developed a fungus infection involving the hands and feet, which subsequently took on a considerable eczematous element.

The incubation period of epidermophytosis and the length of time that the spores may lie dormant in the skin are unknown. Did this man get his infection at some time during his first period of disability? Did such a long-continued disability make his skin more liable to infection at a subsequent period? If so, how long does the period of disability following a previous industrial dermatitis extend? It was decided in this case that the two skin conditions were not related.

These cases illustrate some of the difficulties confronting the dermatologists who deal with industrial skin diseases.

The difficulty of correct diagnosis can only be obviated by having industrial skin trouble seen as early as possible by the trained observer. Even in his hands the possibility of equitably determining the responsibilities of compensation in some cases must await upon the knowledge of factors at present unknown or at best only guessed at. Both the clinician and the laboratory worker are now confronted with a vast amount of work from the constantly increasing pressure of the demands to know the modes of infection, the reasons for the widely varying individual susceptibility, the length of the dor-

mant and the growth periods of the organisms, and finally a successful specific therapy.

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LINDA A. J. RICHARDS

BY ALFRED WORCESTER, M.D.*

THE announcement a few weeks since of the death of the first American trained nurse must have been a surprise to many of Miss Richards' old friends who had long lost sight of her. But it must also have been a consolation to them to have heard that at the last she had been cared for in the New England Hospital for Women and Children where she received her training and where she was once the superintendent.

Few now living can remember the brave start of that little training school which has the proud distinction of having given the earliest American diploma to America's most famous nurse. Nor are there many left who can remember the starting by Miss Richards of the great Boston nursing schools, first at the Massachusetts General and then at the City Hospital, now more than half a century ago.

The present generation can hardly imagine the obstacles which this great pioneer nurse had to surmount. And yet the bare outline of her many and varied services for the relief of suffering humanity will always evoke wonder that any one woman could have done so much. If only to have started many of our now famous hospital and asylum training schools, or if only to have established the profession of nursing in Japan, either service would have been quite enough for her lasting honor. But how little did Linda Richards care for fame! Only after long persuasion would she assent to the publication of her modest "Reminiscences", which if it may now be told were woven out of letters she wrote in answer to our special questions about her life-work.

If any complete story of her life shall ever be written, the comparison will at once suggest itself between the first American and the first English trained nurse. They knew and admired each other. In introducing Miss Richards to the Matron of the Edinburgh Royal Infirmary, Miss Nightingale wrote of her: "I have seldom seen anyone who struck me as so admirable. I think we have as much to learn from her as she has from us." And years afterwards Miss Richards wrote: "Many and varied blessings have come to me but never one greater than the privilege of having known Florence Nightingale."

Unlike as these two women were in their education, in their inheritance and social position and in popular renown, yet in what is of vastly greater importance they were much alike. Both of them were "born nurses", that is, from early girlhood each found her greatest delight in helping the helpless; and yet while they both longed for training as nurses, not until they were in their thirties was the way open for either of them. And then each within a few months' time absorbed in full all of the art of nursing that had been accumulating during preceding centuries.

Miss Nightingale found her teachers at Bruges and Kaiserswerth. Miss Richards found hers in Roxbury, where Doctor Zakrzweska (who had been a famous nurse in Berlin before she became an equally famous physician) had been teaching obstetric nursing for several years before Doctor Susan Dimock, returning from visits at Kaiserswerth and St. Thomas's, joined her in starting America's first training school. This was in 1872—a memorable year for American nurses.

The art of nursing like every other art can be learned only from masters of it. And without doubt Linda Richards still had much to learn when immediately after her graduation she became the night superintendent of nurses at the Bellevue Hospital. But in that training school, which was then only just beginning, there was more opportunity for her to teach the art of nursing than there was to learn anything more of it, for Sister Helen who was then in charge was herself not a trained nurse. In fact she indignantly disclaimed any knowledge of nursing, as for instance when asked by a young nurse how to make a poultice.

Linda Richards' great gain from her year in New York was thus not in the art of nursing but in the quite distinct art of hospital management, of which Sister Helen was a past-master. And it was fortunate that Miss Richards had had this experience before undertaking the establishment of the Boston training schools. More especially was this true in the case of the Boston City Hospital where she became Matron as well as Superintendent of Nurses.

Only those who remember the surgeons and

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physicians of the Massachusetts General staff, and their hostility to nursing schools, can appreciate the victory Linda Richards won in that ultraconservative institution. Take it all in all that was her most remarkable achievement. For in starting the Boston City Hospital training school she had the encouragement of the Resident Physician, Dr. Edward Cowles who led his profession in promoting the advance of trained nursing. Moreover, besides her previous experience at the Massachusetts General, she then had had the immense advantage of a half year in several famous British hospitals, under the coaching of Miss Nightingale and that of her favorite disciples. She was the apt pupil of these great Matrons. Already an accomplished nurse she now became an equally great teacher of nursing.

After her return from Europe could Miss Richards only have had a half year's rest, before undertaking the City Hospital matronship, she might perhaps have escaped the physical breakdown which came within six months and lasted two full years. In the previous seven years, since she began her training, she had not learned that there ever could be any limit to her own superb strength. And in fact no one in those days seemed to know that neither nurse nor matron can work nights as well as days without rest and recreation.

Hard for her as this period of invalidism must have been it is easy to believe that it was not without its special value in the development of her character. Her marvelous patience and sympathy as well as her solicitude for the health and comfort of her pupil-nurses, were no doubt enhanced by this experience. And here again may be seen a remarkable parallelism to what befell England's greatest nurse after her tremendous activity in the Crimaea. But here the resemblance of their careers would seem to end, for while Miss Nightingale's influence in directing the advance of trained nursing was afterwards exerted from behind the shelter of her supposed invalidism, Miss Richards, on the other hand, for the next thirty years in one hospital after another was either starting or reviving training schools in which her influence is still their inspiration.

The matronship of the Boston City Hospital awaited her recovery. And there within the three following years she brought that training school up into first rank. Those of us who remember her there will not need to be reminded of her poise, her intimate knowledge of every patient's needs, her hearty coöperation in every reform. And, be it noted, those were years of revolutionary changes for both nurses and doctors. But not for several years after Miss Richards had seen the wonderful success of Lister's antiseptic surgery in Edinburgh was there in Boston anything more than feeble imitation of his methods. If by chance there then was a case of healing "by first intention", as wounds are all expected to heal nowadays, such a case would be put on exhibition. The nursing therefore was then far harder, when pus leaked through every dressing, when appendicitis, as yet unnamed, meant death from peritonitis, and when for the diphtheria patient there was neither antitoxin nor possible intubation.

Before any of the staff had faith in the germ origin of disease, and in fact before asepsis was conceived, Linda Richards, knowing the therapeutic value of fresh air and soap-and-water cleanliness, taught it and required it. But her still greater service was in sharing with her nurses her own inspiration. Nursing as she always believed was a high calling. And in such employment of her own motherliness she recognized her privilege of serving her Lord and Master. Under her governance the hospital offered to incoming patients better chances for recovery or, that being impossible, a far better place for their departure from this world.

It was therefore quite in the line of her life-purpose that she undertook missionary service in Japan. She was at the acme of her powers, and had fairly earned highest rank in her profession, when she left friends and country in order to demonstrate practical Christianity in a non-Christian land. She counted neither the sacrifice of salary and material comforts nor the difficulty of learning a foreign language and strangely different customs. No danger did she fear, no future hardships fazed her. In fact she always was ready and even eager to move into entirely new fields of service. She never outgrew her youthful enthusiasms. For her the future was ever alluring.

Probably her five years in Japan were her happiest years. There she could build up from the very bottom, and in accordance with her own ideals, a nursing organization that would serve as a model for that newly awakened nation. What Florence Nightingale did for England Linda Richards did for Japan. Fortunately for her there was at first no hospital there, in need of reform. In her own little home with only an occasional patient to care for she began her training school. How like that was to the beginning of the Kaiserswerth School in Fliedner's little garden-house not quite half a century earlier! And what a lesson it was for her young pupil-nurses when she herself by washing out a baby's eyes every twenty minutes all night long saved its sight! No wonder is it that she won public support for the proposed training school and hospital.

A call for some different service was always for Linda Richards a signal that where she then was serving she had accomplished her mission. She was not worldly wise. Again and again after bringing order out of chaos she left for her successor a berth which she had made comfortable, in order to undertake amid all sorts of discomforts what to others seemed to be a far less important work. This

was from no instability of character but rather from unswerving devotion to her ideal of Christian service. Never regardful of possible promotion, her only question was as to where she was needed most.

During the five years of her absence from this country Linda Richards lost her leadership in the development of American nursing. Just as the British nurses, in organizing their new profession, forsook their former chief, so the new leaders of trained nurses in America were quite content that Miss Richards henceforth should remain in the inconspicuous background. They seemed to sense her lack of sympathy with their purposes. And just as Miss Nightingale's strenuous opposition to the governmental examination and registration of nurses was ineffective, equally so was Miss Richards' silent dissent in the new requirements of the State and National organizations of nurses. Her forte was in exemplifying her ideals of nursing, not in public pleading for their adoption, and controversy was entirely foreign to her nature. But no greater mistake could be made than to ascribe her preference for the line of least resistance to any weakness of character. Her complaisance was only the perfect fruit of her innate courteous consideration of those with whom she differed.

Quite in accordance with her ideals of nursing Miss Richards' first service after her return from Japan was for the Philadelphia Visiting Nurses Society. That was long before there was general recognition in this country of any need for special training in this kind of nursing or admission that such training should be included in a training school's curriculum. The belief was then maintained that training in the wards of a hospital was fully sufficient training for all kinds of outside nursing. But Linda Richards knew better. From her own experience as a pupil-nurse she knew the educational value of service in the homes of her patient. Moreover, in her Japanese School she had made such outside service an essential part of the training.

Unfortunately for the advancement of visiting nursing service, and to her own great disappointment, Miss Richards soon found herself unable to trudge through the city streets in keeping track of her nurses' work. And still other disappointments were in store for her, first at the Kirkbride Asylum where she found the conditions not yet favorable for a training school, and then at the Methodist Episcopal Hospital where, in spite of congenial environment, her health and strength proved to be insufficient. It would seem as if the climate there was too much for her were it not for a second trial of it a few years later as Superintendent of the Training School of the University of Pennsylvania Hospital where she completed the two years to which she now tried to limit her engagements.

Including these positions held in Philadelphia, Miss Richards in her twenty years of active service after her return from Japan was the superintendent of ten different training schools. Her most distinguished service was in establishing such schools in the Taunton, Worcester and Kalamazoo Hospitals for the Insane. She was thus occupied during the last twelve years before her retirement in 1911.

Forty years earlier, before there was any training school in this country, Linda Richards had served for a few months as an untrained nurse in the Boston City Hospital amid discouragements now almost inconceivable. A few years later to her was given the redemption of that hospital, a task not unlike that given to Agnes Jones in the Liverpool Workhouse Infirmary, which has been immortalized in Florence Nightingale's "Una among the Lions".

For some years after her retirement from active service Miss Richards kept in touch with her old comrades, cheering them on in the work to which she had devoted her life. Of the many matrons and superintendents she herself had trained, only very few survived her. In the advance of the science of nursing she had been left far behind; but in the art of nursing she never lost her preëminence. On the rare occasions when in spite of her feebleness she appeared in public, as for example at the fiftieth anniversary of her own graduation and, a few years later, of the establishment of the Massachusetts General Hospital Training School, she must have seemed to the present generation almost as a wraith from out of the remote past. Nor is it any wonder that before her death she had been almost completely forgotten by those who many years earlier had heard of her absolute helplessness. And yet in spite of the blindness and the paralysis of her wasted body, not until her brave spirit was about to leave us was there any lessening of her loving thoughtfulness for others.

MEDICAL HISTORY

A NOTE ON THE REGULATION OF THE PRACTICE OF MEDICINE IN EIGHTEENTH CENTURY MASSACHUSETTS

BY ROBERT FRANCIS SEYBOLT*

MEDICAL quackery was a subject of profound and widespread concern in eighteenth century America. The period was an open season for the "pretended Physician," and there were few laws restricting his uncertain, and often lethal ministrations. However, he did not enjoy the protection of the press: writers were everywhere attacking and ridiculing the "Empiricism" of the "Irregular Practitioner". Occasionally, the newspapers of the various colonies published recommendations for statutory regulation of the practice of medicine. A proposal of this sort appeared in *The Boston Weekly News Letter*, Dec. 29-Jan. 5, 1737, a "Prayer" for legislation that would exterminate the "*Shoemakers, Weavers* and *Almanack-Makers*" who were practicing medicine in the Province of Massachusetts:

January 3, 1737.

To the Judicious and Learned President and Members of the *Medical Society* in *Boston*,

GENTLEMEN,

As the following is of the utmost Importance, I beg leave to Introduce it in the following manner;

WE are told, 'That the *Dutch* who know the value 'of Money better than all their Neighbours, grew 'at one Time so fond of Tulips, that their richest 'Merchants were in Danger of being ruined by the 'excessive Prices, which in their Frenzy, they gave 'for Tulips of uncommon Colours. This was called '*Tulippomany*, or, An Infatuation in Favour of 'Tulips.

AT present we are infected with an *Empiricomany*, or, An Infatuation in Favour of *Empiricism* or *Quackery*. To put a stop to this growing Evil, I believe it may be proper that the World should be told, That tho' our Laws in this Country say nothing; yet the Laws of *England* are not silent on this Head. And indeed it would be absurd to suppose, that the Law should make effectual Provision for the Security of our Liberty and Property and should take no Care for our Lives; That I should be able to maintain an Action against an ignorant Smith, who pricks my Horse in shooing him, and there should be no Remedy against a Quack, who, attempting to remove some slight Ailment, thro' downright Ignorance poisons me: In this Case the Party injur'd cannot have his Action, because debarred from that Remedy by the very Mischief fallen upon him, viz. His Death, by the Ignorance of the pretended Physician. But Law and Reason teach us, that such an *Irregular Practitioner*, may be called at the King's Suit, to answer for the Life of a Subject; and for the same Reason ought to answer the Widow or Heir in an Appeal of Death. The Crime under Consideration is (in the Opinion of some judicial Lawyers) MANSLAUGHTER at least, if not MURDER. And let our *Empiricks* remember, I say, Let our *Shoemakers*, *Weavers* and *Almanack-Makers*, with their virtuous Consorts, who have laid aside the proper Business of their Lives, to turn Quacks, remember, and the injur'd Families take Notice, that two successive Convictions of Man-slaughter only, entitle the Criminal to the Gallows as effectually as one Conviction of Murther.

"OUR Ancestors did not think fit to rest the Safety "of the Subjects upon the Policy of the Common Law "alone, but have made several Acts of Parliament "for Regulating the Practice of Physick; and for "that purpose the College of Physicians in *London*, "was incorporated in the Tenth Year of King "Henry VIII, with ample Powers in their Charter; "which Charter was confirmed by Act of Parliament "in the Fourteenth Year of the same King; By these "it is granted, among other Things,

"THAT no Body shall exercise the Faculty of "Physick in *London*, or within seven Miles round it, "unless he be admitted there by the President and "Community of said College, under their common "Seal, under the Penalty of *One Hundred Shillings* "for every Month in which he shall so exercise his "said Faculty, a Moiety to the King, and the other "Moiety to the President and College. And it is "further granted, That the President and College "may yearly choose Four who shall have the Survey "and Scrutiny, Correction and Government of all "and singular the Physicians of said City, and other "foreign Physicians whatsoever, using that Faculty "within said City or Suburbs, or within the Compass "of seven Miles, and the Punishment of them for "their Faults, in not well executing, doing and using "the same; and also the Survey of all Medicines & "Receipes; so that the Punishment of such Persons "so making Default in the Premises may be executed "by Fines, Amerciaments and Imprisonments of their "Bodies and by other fit and reasonable Ways.

"THE said Act of Parliament confirms the Charter "in all Things; and further enacts:

"THAT there be eight Elects of said College, and "no Person shall henceforth be suffer'd to practice "in Physick through *England*, until such Time that "he be examined at *London* by the President and "Three of the Elects, and to have from the President "or Elects Letters Testimonial of their Approving "and Examination, except he be a Graduate of *Ox-"ford* or Cambridge, which hath accomplished all "Things for his Form without Grace.

THIS Charter and Act of Parliament have been enforced and carried into Execution in numberless Instances, against the several Persons prohibited therein; and have after come in Question in *Westminster-Hall*, and the Execution of the Powers therein have been affirmed as often as the said Powers have been duly pursued.

Thus far respecting the Practice and Practitioners of Physic in *England*.

Methinks it would be a Matter of no great Difficulty to concert some proper Measures for regulating the Practice of Physick thro'out this Province. And as the foregoing is a noble Example; tho' we cannot at present come up to it in all respects, yet we may so far proceed, as to pass such Acts in our General Assembly in order to prevent these growing Mischiefs; so that no Person shall be allowed to practice Physick within the Limits of this Province, unless he be first examined by such regular, approved

*Seybolt—Professor of the History of Education, University of Illinois 1926-. For record and address of author see "This Week's Issue", page 1076.

and learned Physicians and Surgeons as the Honourable Court shall see meet to appoint.

Perhaps some may object and say, It would be a pity to put down their Doctor, altho' he is a Man of no Learning, yet they think he has done some Good. I would answer to such honest, tho' deluded People, that if upon Examination, the Person is found to understand his Business, he will certainly have liberty to continue in the Practice of Physick; and if it appears that he is no ways qualified for the Practice, I think they are much safer without him; and it's more prudent trusting to the Care of Providence and a good Nurse than such a vile Imposture.

THAT Almighty GOD would be graciously pleased to put it into the Hearts of the Legislature to make and pass some wholesome Laws in order to establish a set of experienced and approved Physicians, throughout this Province, is the sincere Prayer of

Gentlemen,
Your most obedient humble Servant,
Philanthropos.

Although it would not wholly satisfy the requirements proposed by "*Philanthropos,*" the Massachusetts law of May 2, 1649 (*Recs. of the Gov. and Company of the Mass. Bay in New Eng.*, II, 278-279) provided a certain measure of regulation:

Forasmuch as the law of God (Exod. 10:13) allowes no man to touch the life or lime of any person, except in a iudicial way,—

Be it hereby ordered and decreed, that no person or persons whatsoever that are implied about the bodies of men, weomen, or children, for preservation of life or health (as phisitians, chirurgions, or others,) psume to exercise or put forth any act contrary to the knowne rules of art, nor exercise any force, violence, or cruelty upon or towards the bodies of any, whether yong or ould (no, not in the most difficult & despate cases,) without the advice & consent of such as are skilfull in the same art, if such may be had, or at least of the wisest & gravest then present, and consent of the patient or patients, if they be mentis compotes, much lesse contrary to such advice & consent, upon such punishment as the nature of the fact may deserve; which law is not intended to discourage any from a lawfull use of their skill, but rather to incourage and direct them in the right use thereof, and to inhibit and restraine the presumptuous arrogance of such as, through prefidence of their own skill or any other synister respects, dare be bould to attempt to exercise any vyolence upon or towards the bodies of yong or ould, to the preiudice or hazard of the life or lime of men, weomen, or children.

"*Philanthropos*" may or may not have had this enactment in mind. In any case, it had fallen into disuse; and his "Prayer" was not answered, even in part, until November 1, 1781, when the legislature approved the incorporation of the Massachusetts Medical Society:

And whereas it is clearly of Importance, that a just Discrimination should be made between such as are duly educated and properly qualified for the Duties of their Profession and those who may ignorantly and wickedly administer Medicine, whereby the Health and Lives of many valuable Individuals are endangered, or perhaps lost to the Community.

Be it therefore enacted by the Authority aforesaid, That the President and Fellows of said Society, or other such of their Officers or Fellows as they shall appoint, shall have full Power and Authority to examine all Candidates for the Practice of Physic and Surgery (who shall offer themselves for Examination, respecting their Skill in their Profession) and if upon such Examination, the said Candidates shall be found skilled in their Profession and fitted for the Practice of it, they shall receive the Approbation of the Society in Letters Testimonial of such Examination, under the Seal of the said Society, signed by the President, or such other Person or Persons as shall be appointed for that Purpose.

EXCERPTS FROM THE FIRST PRIZE WINNING GORGAS MEMORIAL CONTEST

(Continued from page 1048)

ing sickness, and similar dread ailments calls for intensive laboratory research and study.

Some of the most fatal of these diseases may thrive in the temperate regions also. Malaria presents a world-wide and ever-present problem. Even when the sources and carriers of infection are discovered, and practical methods of control or prevention have been devised, there remains the all-important task of increasing at lower costs the efficiency of these methods.

In addition to the research work on these and many other diseases which will be carried on in the Gorgas Memorial Laboratory in Panama, it is intended that the Institute shall show how the Periodic Health Examination helps to eradicate the impediments to long life and better personal health.

There is no doubt that preventive medicine has come to the front. Prophylaxis to prevent illness has replaced treatment; treatment now merely attempts to overcome what should have been prevented. The measures for the prevention of infectious diseases are among the strongest weapons for the betterment of mankind now in the hands of civilization. If the world would allow them to be used to the fullest extent, the treatment of infectious diseases would eventually become unnecessary, for they would cease to exist. But the people must first be educated tc the benefits of periodic health examinations by their own personal physician and dentist.

Diagnosis of disease is probably the most important service that the physician renders to his patient. Diagnosis enables the physician to pick out from the many diseases causing somewhat similar symptoms the ones for which medicine has remedies; and, what is equally important, even if he has no remedy, it enables him also to discover diseases in their early stages, and offer means by which their course can be arrested. Yet it is extremely difficult to make the people as a whole realize that in order to eliminate unnecessary illness or to prevent diseases which can be arrested in their early stages, it is necessary to have a medical examination yearly.

If the doctors of the United States could exert that same influence over the people of this country that General Gorgas had over the people of Havana and Panama and over the United States Army, all preventable diseases would be reduced to an astonishing minimum. It is toward this goal that the Gorgas Memorial Institute is striving.

Medicine and civilization advance and retreat together.

It is to this end that the Gorgas Memorial Institute was founded and the opportunity thus offered to the peoples of the Americas to lead the world in its redemption from communicable and infectious disease.

Case Records
of the
Massachusetts General Hospital

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED IN WEEKLY CLINICO-PATHOLOGICAL EXERCISES

EDITED BY R. C. CABOT, M.D.

F. M. PAINTER, A.B., ASSISTANT EDITOR

CASE 16221

SIX WEEKS' COUGH

MEDICAL DEPARTMENT

First admission. An Italian fifteen years old entered October 22, ten years before his second admission, for treatment of a femur fractured into the knee joint. General physical examination at this time was negative. He made an excellent recovery and was discharged December 18.

Second admission. January 11, ten years later, he reëntered complaining of cough of six weeks' duration.

The cough came on gradually following a head cold. There was a moderate amount of thin white sputum. Since the onset he had had a fever of about 101°. He stayed in bed only because he was told to. He had not lost appetite or strength and had had no other complaints except that when he got out of bed his legs were cold and shook and that he had profuse sweats every night. He had lost eighteen pounds, most of it in the past six weeks.

One brother died at home of pulmonary tuberculosis five years before the patient's admission.

The past history is negative.

Clinical examination showed an obese boy lying fairly comfortably in bed. Chest signs as shown in Figure 1. Apex impulse of the heart not seen or felt. No abnormalities recorded. The abdomen seemed distended, though the patient said it was no larger than it always had been. Shifting dullness and fluid wave. One external hemorrhoid. On rectal examination the insertion of one finger caused an amazing reaction of twitching, jumping and grunting. The finger did not go far enough to feel the prostate. The patient refused to talk about it except to imply that it had hurt. Sphincter not excessively tight.

Urine: amount normal, specific gravity 1.012 to 1.023, a very slight trace to a trace of albumin at all of five examinations, 5 to 20 leukocytes per field at all, 1 or 2 red cells once. Blood: 11,100 to 17,300 leukocytes, 83 to 93 per cent polynuclears, moderate achromia, slight anisocytosis and poikilocytosis in smears January 11 and 30; in the second smear the neutrophiles had fine deeply staining basophilic granulation not seen in another smear stained at the same time and in the same manner. Hinton negative. Abdominal tap: 2,000 cubic centimeters of yellow to amber colored cloudy fluid, specific gravity 1.018, cells, 1,180 leukocytes, one per cent polynuclears, 97 per cent lymphocytes, 2 per cent large mononuclears, 300 red cells.

Temperature 100.4° to 104.7°, pulse 92 to 155, respirations 28 to 60.

X-ray examination showed the diaphragm unusually high on both sides, more on the right than on the left. There was very little respiratory motion. There was some haziness around the right base and rather general mottling throughout the lung fields. There was no evidence of any considerable amount of fluid on either side. A second examination confirmed the previous findings.

January 13 the visiting physician found the lung signs as shown in Figure 2.

January 17 with the pupils dilated several yellowish rounded spots about one-quarter the size of the disc were seen in the right eye and one in the left eye. The following day another examiner found one spot in each eye about one-half the diameter of the disc. January 24 the patient was stuporous, taking very little food. January 27 the chest was full of wet râles, especially at the left base. He was coughing up blood and rapidly losing ground. January 31 he died.

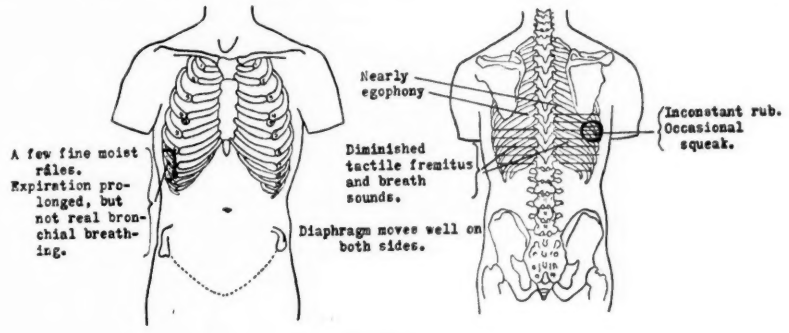
Nearly egophony
Inconstant rub. Occasional squeak.
A few fine moist râles. Expiration prolonged, but not real bronchial breathing.
Diminished tactile fremitus and breath sounds.
Diaphragm moves well on both sides.

FIGURE 1.

CLINICAL DISCUSSION

BY RICHARD C. CABOT, M.D., AND MARCY L. SUSSMAN, M.D.

NOTES ON THE HISTORY

DR. CABOT: We are looking for constitutional symptoms in relation to the question of tuber-

culosis. Certain constitutional symptoms such as loss of appetite and strength are said to be absent. But it seems to me a man whose legs shake aside from nervous fright has lost strength. Of course profuse sweats every night mean fever ordinarily and with lung trouble make us think of tuberculosis. The loss of weight is of course significant. Eighteen pounds in six weeks is a rather surprising loss of weight.

They say the brother died at home, so the patient was probably exposed. It would be better to say definitely whether he was exposed. When the brother was at home the patient might have been away.

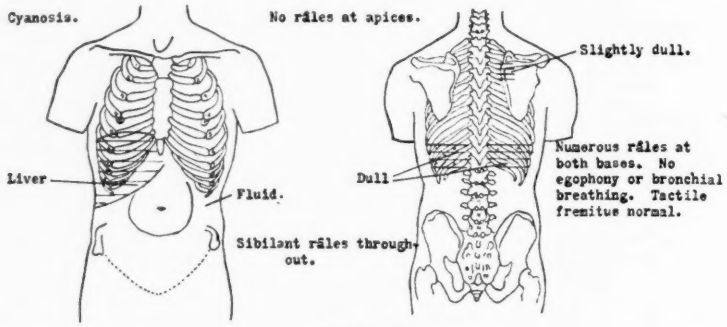

FIGURE 2.

NOTES ON THE PHYSICAL EXAMINATION

What can there be on the basis of those lung signs in the physical examination?

A STUDENT: It can be double pleural effusion.

DR. CABOT: That is rare. We expect it to be unilateral. What about the chances of its being double hydrothorax? We do not know about the heart yet. Unless there is a heart lesion double hydrothorax can be ruled out. What is the other possibility besides pleural effusion and double hydrothorax?

A STUDENT: Congestion.

DR. CABOT: That is the same as hydrothorax. Can it be double pneumonia?

A STUDENT: Not very well.

DR. CABOT: If you do not know the third possibility you should learn it.

A STUDENT: High diaphragm.

DR. CABOT: Yes. That is something I had to find out after leaving the medical school,—normal lungs, normal heart and high diaphragm give dullness at both lung bases. The dullness is really over the elevated liver and spleen and not in the chest at all. We do not expect tactile fremitus or breath sounds over the liver.

The question is whether the patient was correct in believing that his abdomen was no larger than normal. He probably was not born with shifting dullness and a fluid wave. Of course his ascites would push up the diaphragm and furnish explanation of the signs apparently, not actually, in the chest.

Many patients have the sort of symptoms he had on rectal examination. I do not think we can conclude anything from that.

The blood shows that he has a secondary anemia, due presumably to whatever cause it is that produced his ascites.

The next thing would naturally be to tap the belly. Let us imagine what they might find. Where are the probable causes? Not in the heart, not in the kidneys. There is no edema anywhere else. There are no signs of uremia. We do not know of anything wrong in the blood, no retention products. It does not seem like a neoplasm. Peritoneal tuberculosis certainly cannot be ruled out with this history. Cirrhosis of the liver is rather improbable at twenty-five, and we have nothing in particular to suggest it. We have nothing left except nephritis or possibly tuberculosis.

Does the specific gravity of 1.018 in the tap fluid help us? Yes. That is about what we expect in tuberculous peritonitis. It is not the gravity to be expected in nephritis or with any transudate. It would do for malignant disease if there were any evidence of that. It is a high gravity as gravities go in abdominal taps.

We have two pages of continuous fever ranging from 101° to 104°, looking like a typhoid chart. Have we anything else to make us think of typhoid? The pulse is relatively high for typhoid, and I do not believe with the ascites we have any reason to think of that. He had a continuous fever for twenty days, proving that it is infection and backing up the idea of tuberculous peritonitis.

DR. SUSSMAN: These films show the process much better. They show the diaphragm high on both sides and this mottling throughout both lungs. I notice in Dr. Holmes' note he says "High diaphragm might cause such an appearance". With a high diaphragm the lung markings seem to stand out very much more prominently and a miliary process may be simulated. This was checked on the same day and the film shows what seems to be very much more probably a pathologic process, miliary tuberculosis; we cannot rule out miliary metastasis.

DR. CABOT: People do not die very quickly of tuberculous peritonitis. We have to have something else to account for his rapid death,

and miliary tuberculosis is the natural thing.

DR. SUSSMAN: I do not think any definite areas stand out from the rest of the mottling. With a high diaphragm it would be difficult to make out. There is slight haziness of the costophrenic angle. We could not say definitely that it is fluid.

DR. CABOT: Those yellow spots in the eye grounds have been talked about in textbooks as evidence of miliary tuberculosis for fifty or sixty years, but are very rarely seen. People are always quizzing and lecturing on miliary tubercles in the choroid, so that we are always looking for them, but we almost never find them.

DIFFERENTIAL DIAGNOSIS

I do not see any chance of our going wrong on a diagnosis of a tuberculosis which involves the peritoneum and the lungs. He has coughed up blood, so it must be beyond the miliary stage, —there must be some ulcerative process there. I do not see that we can say anything else. There is no indication that it involves the kidneys, bones or glands or any part of the body except the two I have mentioned. In the heart and other organs there is no suggestion of any disease. There is tuberculous peritonitis; there should be miliary tuberculosis, and presumably it has advanced beyond that to ulceration.

A STUDENT: Isn't there the possibility of central nervous system involvement?

DR. CABOT: With miliary tuberculosis we always think of a probable involvement of the brain along with the other organs, like the spleen and kidneys, which show miliary tuberculosis. The spots in the choroid give good reason to suppose there is some process in the brain. I do not think we can be more definite without evidence of meningitis.

A STUDENT: What do you think was the original focus?

DR. CABOT: I suppose it was in the gastrointestinal tract.

X-RAY INTERPRETATION

The mottling of the lung fields may be of tuberculous origin, but the compression of the lungs from the high diaphragm and respiratory motion could produce a similar picture.

Films taken at a second examination showed the characteristic fine mottling of miliary tuberculosis throughout the lung.

BACTERIOLOGIC REPORT

The sputa showed blood at three of six examinations and tubercle bacilli at two.

CLINICAL DIAGNOSIS (FROM HOSPITAL RECORD)

Miliary tuberculosis.

DR. RICHARD C. CABOT'S DIAGNOSES

Tuberculous peritonitis.
Pulmonary tuberculosis.
Miliary tuberculosis.

ANATOMIC DIAGNOSES

Tuberculosis of the kidneys.
Miliary tuberculosis.
Tuberculous ulcers of the large intestine.
Tuberculous peritonitis.
Tuberculous meningitis, slight.
Nephrolithiasis.

PATHOLOGIC DISCUSSION

BY TRACY B. MALLORY, M.D.

Miliary tuberculosis was found. The lungs were studded with tubercles which from the pathologic point of view were technically beyond the miliary stage, and would be described as conglomerate tubercles. There were no extensive lesions, and I am rather surprised at the hemoptysis. The intestines showed a couple of ulcers in the large intestine just beyond the cecum which also, however, looked like recent affairs. A tuberculous peritonitis was found, also, unquestionably, of short duration. In the kidneys an extensive process was present, a bilateral fresh miliary involvement and an old focus in the right kidney. There was a very slight degree of meningitis. The choroid tubercle was confirmed by removal and histologic examination.

DR. CABOT: Will you please read a little more detail about the kidney?

DR. MALLORY: The kidneys weighed 525 grams. That is very large, even for an adult. They were firm, smooth and contained innumerable small tubercles, most numerous in the cortices. At the inferior pole of the right kidney there were a few dilated calices within which were found hard irregular calculi each measuring about one centimeter in length. The surfaces of the pyramids around these calices were definitely caseous. I think this was the chief and persisting focus of infection. Considering that there was stone as well as tuberculosis it is surprising that renal symptoms were not more in evidence.

DR. CABOT: What about the brain?

DR. MALLORY: It showed a very recent fresh meningitis.

DR. CABOT: I think that is very instructive. The urine did not show enough and there were not enough symptoms to make us think of the kidney. The diagnosis would not have made any difference at this stage. If we could have made it years earlier it might have made quite a difference.

ORDERS

January 11. Bed. Force fluids to 180 ounces.

January 12. Acid fast precautions. Codein half a grain by mouth every four hours p.r.n. for cough.

January 13 to 29 inclusive. Codein half a grain by mouth, one dose, or every three hours or four hours p.r.n. daily for cough.

January 30. Offer orange juice with lactose

frequently. Proportions: to 110 grams of orange juice 15 to 30 grams of lactose, according to the amount of carbohydrate the patient is to have.

January 31. Morphia ¼ grain s.c.

COMMENTS ON THE TREATMENT, BY DR. CABOT

The forcing of fluids is with some physicians a standing order in febrile cases. It used to be fashionable in typhoid. I do not think it rests on a very secure basis of observed benefit.

Codein is an effective remedy if one desires to check an exhausting and unproductive cough. It has replaced most of the cough mixtures.

Orange juice and lactose is a nourishing and palatable mixture which a good many febrile patients can take even when the stomach is upset.

CASE 16222

TUMOR OF THE LOWER ABDOMEN

UROLOGICAL DEPARTMENT

A married Italian laborer forty-seven years old was admitted to the hospital February 25.

He was first seen in the Out-Patient Department a month previously, complaining of a mass in the lower abdomen, frequent and painful urination, and swelling of the left leg. These symptoms had been present for at least three years. The onset had been gradual and there had been little if any change since the beginning. The abdominal mass had not changed in size in so far as he was aware.

His general health had been excellent. Six years ago a rectal abscess had been opened. Further details concerning this could not be obtained. Five years ago he had gonorrhea. Except for these facts the past history was entirely negative.

Physical examination at the time of admission showed a fairly well developed and rather undernourished man of about middle age. He was in no distress. The heart and lungs were normal and there were no physical abnormalities except the following: Just above the pubes a rounded mass extending to the umbilicus was evident as the patient lay in bed. Palpation showed this to be a firm, symmetrical, slightly tender tumor mass which felt fluctuant above and firm in its lower portion. The mass extended deep into the pelvis and resembled an overdistended bladder. There was a moderate degree of swelling of the left leg and thigh which pitted but little on pressure as if it were edema of long standing. On rectal examination the suprapubic tumor could barely be felt as a firm, slightly tender mass well above the base of the bladder. The fingers and toes showed marked clubbing.

The urine was cloudy and acid, specific gravity 1,008, albumin a trace, sugar negative. The sediment was loaded with pus. Non-protein nitrogen 40 milligrams per 100 cubic centimeters. Hinton negative. Phthalein test: appearance time twenty-five minutes, 16 per cent in two hours. Leukocyte count 9100, hemoglobin 90 per cent. Blood smear normal with the exception of some increase in the platelets. The temperature, pulse, and respirations were normal.

Cystoscopic examination was performed under spinal anesthesia. With some difficulty the cystoscope was introduced into the bladder and two or three ounces of cloudy residual urine was evacuated. It was noticed that the cystoscope had to be introduced practically for its full length before it entered the bladder. Inspection of the interior of the bladder showed a moderate degree of acute inflammation. There was no stone, diverticulum or tumor, but a very definite distortion of the bladder was present. A cystogram was made, which is shown in the accompanying illustration. (Plate I.) Following the cystoscopic examination the patient had a good deal of reaction. The temperature rose to 104° and he had frequent chills. The urine was extremely foul, necessitating constant drainage of the bladder. A barium enema showed an unusual distortion of the rectum as shown in the illustration. (Plate II.)

DISCUSSION

BY FLETCHER H. COLBY, M.D.

The case is an unusual one. Infection of the urinary tract is evident from the presence of pus in the urine. The first impression obtained from examining the patient was that we were dealing with an overdistended bladder from either obstruction to the urinary tract or a nerve lesion. This, however, was quickly disposed of by the fact that instruments passed to the bladder showed the presence of a very small amount of residual urine with no change in the size of the suprapubic tumor. A tumor of the bladder might cause such a mass provided it were extensive. However, the patient had never had hematuria, and cystoscopic examination failed to reveal the presence of any tumor inside the bladder cavity.

The low phthalein excretion suggested damaged kidneys. The barium enema ruled out the rectum and bowel as the primary source of the tumor, but the distortion of the rectum and bladder, both organs being pulled up in the pelvis, showed that there was an intimate relationship between them and the tumor. An inflammatory mass was considered as a cause, but the normal temperature and low leukocyte count together with the long duration of symptoms made this seem improbable. The most reasonable diagnosis seemed to be a slowly growing tumor, neoplastic in nature, arising in the pelvis.

OPERATION

Operation was performed March 11. The abdomen was explored through a median incision. The peritoneal cavity was found to contain very

little fluid. Filling the entire pelvis was an irregular firm mass to which loops of small bowel and omentum were firmly adherent. The mass was quite evidently inflammatory and so extensive that there was no possibility of freeing it from the adherent structures. The bladder wall was very intimately involved in the mass. The bladder was opened in the midline and its wall was found to be quite thick and so closely associated with the inflammatory mass that it could not be dissected free. The right kidney could be felt as a large, soft, fluctuant mass with a distended ureter running from it to the bladder. The peritoneal cavity was drained and the bladder closed around a large tube.

Pathologic examination of the tissue excised from the mass showed only chronic inflammation.

FURTHER HISTORY

Convalescence was quite stormy and complicated by a breaking down of the abdominal wound. This, however, was resutured and the patient made steady progress toward recovery.

PLATE I. Cystogram. The bladder is seen distended with sodium iodide solution. The whole organ is pulled up high in the pelvis. In the fundus can be seen a well marked filling defect.

Six weeks after operation the abdominal wounds had completely healed. The suprapubic mass could no longer be felt. The edema of the left leg had practically entirely subsided and the patient was feeling well.

FURTHER DISCUSSION

The case is one of pericystitis. Evidently

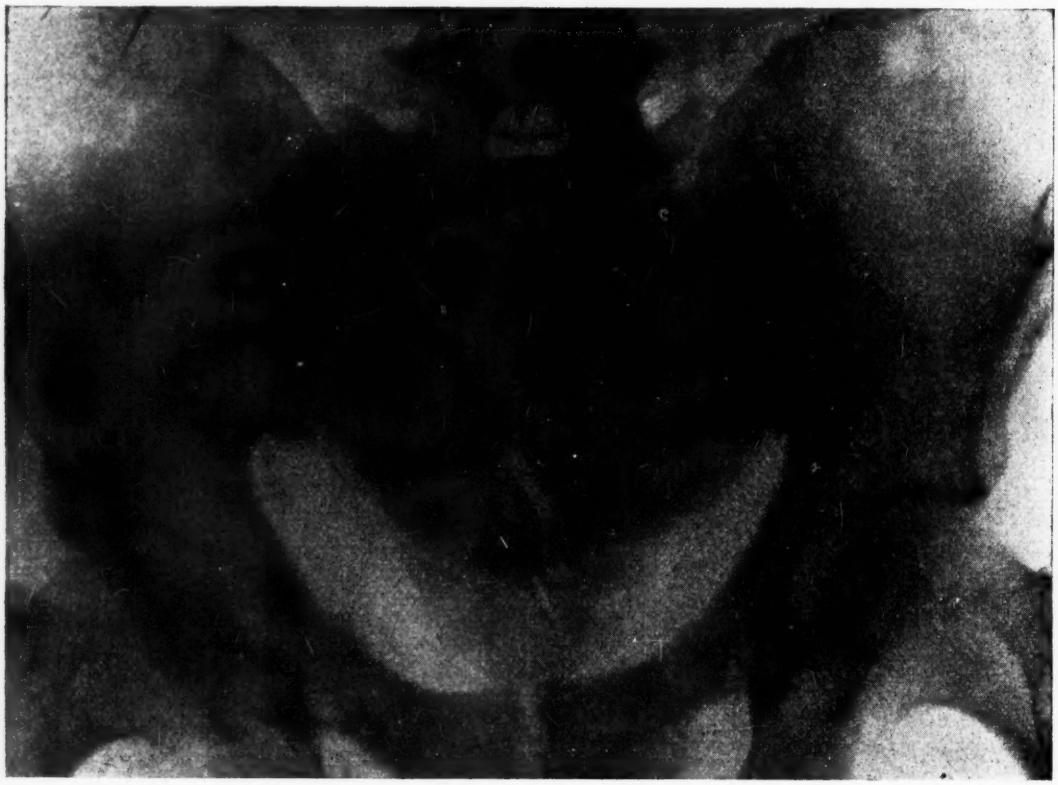

PLATE II. Barium enema. This shows distortion of the rectum, which is pulled up high in the pelvis in much the same manner as the bladder.

there had been a low grade inflammatory process outside the bladder wall which had eventually involved most of the structures in the pelvis. This may have originated as an extension of some infection in the urinary tract or gastro-intestinal tract. Possibly it was blood borne. Partial obstruction to the right kidney by the mass had resulted in pyonephrosis. Operation had afforded sufficient drainage to allow resolution of the inflammatory mass with its disappearance and cessation of symptoms.

DIAGNOSES

Pericystitis.
Right pyonephrosis.

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STATE MEDICINE

THERE is going on before our eyes a socialization of medicine. How far it will go no man can tell. What reaction it will call forth we cannot say. But whether we like it or not, there it is.

It runs contrary to a strong tendency in the practice of medicine which in the past has made this seem (to some individuals) a desirable vocation. Most physicians are individualistic. Some physicians are practicing medicine rather than following a commercial pursuit which would bring greater financial reward, because they can not be happy working for a boss. It is not for pure altruism they practice medicine. It is because medicine offers a certain freedom to order their lives as they see fit. "A poor thing but mine own, sir." Yet it is not a narrow selfishness that binds them to it. They are taking sides with the individual against the mob, the spirit of which is threatening our civilization, as it has threatened and disintegrated other civilizations before ours.

The issue of the individual against society can not easily, in every case, be stated clearly, and generally is not so stated, so that there is need of full and free discussion of not only what lies on the surface, but of those hidden springs of action, those unformulated hypotheses, those latent beliefs, that should be dragged out into the light of day and recognized for what they are. If they are reasonable and cogent, let us know them as such; if, in the light of reason, they are illogical, incoherent, not pertinent, let us learn this also.

It is because there has been introduced House Bill No. 351* that the *Journal* prints the plea of an advocate of the Bill†, and welcomes a discussion of the principles and practices involved. It appears that the Bill has little chance of becoming law now, but it is timely to consider fully and frankly what is involved, the tendencies of the times and all the reasons for and against what is here proposed.

*This bill was designed to create a Department of Public Medicine and Health to take over the activities of the Department of Public Health and of the Department of Mental Diseases, and certain of the activities of the Department of Public Welfare and of the Department of Industrial Accidents.

It was presented by Mr. Page, a member of the House, on the petition of Armand C. Bang and Gilbert W. Haigh. Mr. Bang has been referred to as a statistician who is interested in certain political activities. Dr. Haigh frequently contributes to the Journal on matters relating to state medicine.

The subject of the bill as set forth in Section I is for the purpose of furnishing a free and complete medical service to the people of the commonwealth of Massachusetts, patterned upon the bureau of medicine and surgery of the United States navy.

The administration of this department was designed to consist of a commissioner of public medicine assisted by a board of five other members of the medical corps as deputy commissioners and the five medical administrators were to be registered physicians of at least forty years of age who would be appointed by the Governor. At the expiration of five years the succeeding members should be selected from the three highest ranks of the medical corps (senior medical directors, medical directors, and medical inspectors) in open and competitive examinations conducted under rules promulgated and established by a board of examiners appointed by the first medical administrator, to serve during good behavior and subject to rules of retirement hereinafter specified. Vacancies shall be filled by the holding of special examinations.

Section 9 provides for the detailed completion of the department of physicians and surgeons; Section 10 relates to the detail of the division of dentists; Section 11 to the division of nurses; Section 12 to the division of pharmacists and chemists; and Section 13 to the division of technicians.

Section 14 refers to the establishment or abolition of such other divisions and sub-divisions as it shall deem necessary.

Section 15 provides for the upkeep of public hospitals and the forces employed therein as well as all private hospitals. It shall have full supervision of all private hospitals and their employees: it shall advise and have power of supervision with respect to all questions connected with hygiene and sanitation affecting the people of the commonwealth.

Section 16 provides that the department shall establish and maintain at all times conditions of as perfect health as is humanly possible to attain within the population of the commonwealth through preventive measures rather than cure.

Section 17. The department shall establish a set of rules governing the appointment, promotion, discharge for cause, retirement on account of age or invalidity, hours of duty, sick leave, annual vacations, special vacations for study, and pensions of the personnel of its various divisions with a view to establish within the department a perfect esprit de corps and coöperation.

Section 18. The department shall render free medical and surgical services of all kinds known to science in all cases of sickness, accident, and childbirth, to all citizens of the commonwealth at any time when called upon.

Section 19. Non-citizens of the commonwealth who accept the services of the department shall pay for services rendered.

Section 20. No person connected with the department shall at any time accept a gratuity or present in payment for services rendered hereunder.

Section 21 provides for salaries to be paid to the physicians and dentists and other persons employed.

Section 22 refers to the payment of nurses.

†See page 1078.

Section 23 relates to rental allowances for the employees.

Section 24 permits doctors' and nurses' yearly salaries and allowances in proportion to the number of years in practice.

Section 25 provides for securing a sufficient number of registered members of the medical and allied professions in case there is a shortage.

Section 26 provides that all expenses shall be paid from the treasury of the commonwealth giving to the first medical administrator the authority to expend a sum not exceeding one million dollars as preliminary expenses in establishing the organization of the department and apprising the public thereof.

THE GROWING INTEREST IN HEALTH

THE appearance in magazines and newspapers of articles respecting health seems to show that certain phases of medicine have emerged from the former status of uninteresting topics for common publicity and now take high rank as interesting news material. This change in editorial sentiment is a tribute to the medical profession as well as to the laity because physicians have been trying for many years to have correct facts and opinions made available for application by intelligent people, and the evident interest of the non-medical group seems to demonstrate much more understanding of the tremendous importance of the healthy body as a fundamental requisite of efficiency in one's life work.

The coöperation of editors was shown in the response to the invitation of Dr. Ray Lyman Wilbur to meet at the Department of the Interior, May 16, 1930. They then proceeded to organize themselves into an advisory council to assist the White House Conference on Child Health and Protection with the plan to put before the people of the country scientific information on child health in understandable language.

In addressing the meeting, Secretary Wilbur said:

"It is trying to wedge into American civilization the great opportunities that modern knowledge has expressed through the physician, the teacher, the public health worker—the great advantage that all this has to offer to civilization. I think the public is ready for it and I think it is largely a responsibility of ours to see that our information gets the farthest possible spread. We must do what we can to help the children, not only in this country but in many countries, to get from the accumulated information that has been gathered the real advantages. Unless we do this we are not successful."

This country is particularly fortunate in having the service of Dr. Wilbur who is demonstrating his well-recognized qualities of leadership and organization which will bring about the dissemination of information for the use of those who are responsible for the well-being of children.

The results of the work of the committee will be available at the earliest possible time.

This movement and all other well-conducted publicity plans will operate to build closer relations between the medical profession and the public to the end that quackery will eventually be the resource of those unfortunate people who are, as a class, the victims of comparatively low grade intelligence.

THIS WEEK'S ISSUE

CONTAINS articles by the following named authors:

LUSK, GRAHAM. Ph.D., Sc.D., LL.D., M.D. (Hon.) Munich, 1929. Professor of Physiology, Cornell University Medical College in New York City. His subject is: "Science, Work, and Criticism". Page 1035. Address: 477 First Avenue, New York City.

EMERSON, KENDALL. M.A., M.D. Harvard 1901. F.A.C.S. Managing Director National Tuberculosis Association. His subject is: "Where Are We Going in Tuberculosis Control?" Page 1039. Address: 370 Seventh Avenue, New York City.

CHADWICK, HENRY D. M.D. Harvard 1895. Superintendent, Westfield State Sanatorium 1909-1929. Tuberculosis Controller City of Detroit since May 1929. President, American Sanatorium Association 1930. His subject is: "Tuberculosis in Children". Page 1044. Address: 2100 Seminole Street, Detroit, Michigan.

ROOT, HOWARD F. A.B., M.D. Harvard 1919. Physician New England Deaconess Hospital, Associate in Medicine Peter Bent Brigham and Palmer Memorial Hospitals. Assistant in Medicine, Harvard Medical School Courses for Graduates. Address: 81 Bay State Road, Boston. Associated with him is

ROGERS, MARK H. A.B., M.D. Harvard 1904. F.A.C.S. Professor of Orthopedic Surgery, New England Deaconess Hospital. Address: 418 Beacon Street, Boston. They write on: "Diabetic Neuritis with Paralysis". Page 1049.

HINTON, WILLIAM A. B.S., M.D. Harvard 1912. Pathologist and Director of Research, Boston Dispensary. Chief, Wassermann Laboratory, Massachusetts Department of Health. Instructor in Immunology, Harvard Medical School. Address: 25 Bennet Street, Boston. Associated with him is:

BERK, ARTHUR. M.D. Tufts 1921. Senior Psychiatrist, State Department of Mental Diseases. Physician, Department of Nervous and Mental Diseases, Boston Dispensary. Research Associate, Boston Dispensary. Assistant Physician, Nerve Department, Beth Israel Hospital. Instructor in Neuropathology, Tufts Medical School. Address: 270 Commonwealth Avenue, Boston. Their subject is: "The Hinton Glycerol Cholesterol Reaction for Syphilis. Second Modification." Page 1054.

BLAISDELL, J. HARPER. A.B., M.D. Harvard 1911. Former Assistant Dermatologist Massachusetts General Hospital. Consulting Dermatologist at Winchester Hospital, Malden Hospital, and Gale Hospital, Haverhill. Address:

5 Bay State Road, Boston. His subject is: "Epidermophytosis". Page 1059.

WORCESTER, ALFRED. A.M., M.D. Harvard 1883. Professor of Hygiene, Harvard University. His subject is: "Linda A. J. Richards". Page 1064. Address: 314 Bacon Street, Waltham, Mass.

SEYBOLT, ROBERT F. Ph.B., A.M., Ph.D. Professor of the History of Education, University of Illinois 1926-; Professor, same, Harvard University 1925-26. Fellow, Royal Historical Society. His subject is: "A Note on the Regulation of the Practice of Medicine in Eighteenth Century Massachusetts". Page 1067. Address: University of Illinois, Urbana, Illinois.

MASSACHUSETTS LEGISLATIVE NOTES

Senate No. 436 provides for the amendment of chapter seventy-one of the general laws for adding at the end thereof the following new section:

Section 75. The school committee of every town shall annually ascertain, under regulations prescribed by the department and the commissioner of public welfare, the number of children of school age and resident therein who are crippled. In any town where there are five or more children at the beginning of any school year so crippled as to make attendance at a public school not feasible, and who are ineligible for, or if eligible cannot be accommodated at, a public or private institution, the school committee shall, *and in any town where there are less than five may*, employ a teacher or teachers, *on full or part time*, who shall, with the approval in each case of the department and the commissioner of public welfare, offer instruction to said children in their homes or at such places and under such conditions as the committee may arrange.

House No. 1359 provides for taking in fee by eminent domain under chapter seventy-nine of the General Laws, or acquiring by purchase, for the proposed metropolitan state hospital, land in the city of Waltham and in the towns of Belmont and Lexington, adjoining land already acquired by the commonwealth for said proposed hospital.

MISCELLANY

THE MIDDLESEX COLLEGE OF MEDICINE AND SURGERY

An announcement in the daily papers sets forth that the construction of seven of the units in the plant of the Middlesex College of Medicine and Surgery in Waltham, Massachusetts, is nearing completion so that occupancy for the fall term is assured.

These buildings are of stone, located on South Street, Waltham. The former mansion house of the estate is to be occupied by the faculty. The present partially completed group of buildings includes one for the teaching of anatomy, one to house the chemistry, laboratory and lecture rooms, one for the pathology department, one for the dormitory and one for the physiological laboratory and the utility building.

The dormitory will accommodate five hundred students in its four stories.

The plant will cost about one million dollars which together with other additions is designed to accommodate one thousand students.

The available funds have been augmented by contributions from the alumni.

With this expansion in buildings and equipment it is reasonable to hope that the institution will invite inspection and classification by the Council on Medical Education and Hospitals of the American Medical Association so that its proper position among medical colleges may be made public.

WEEKLY HEALTH INDEX

Telegraphic returns from 65 cities with a total population of thirty million for the week ending May 17, indicate a mortality rate of 12.3 as against a rate of 13.3 for the corresponding week of last year. The highest rate (24.1) appears for Memphis, Tenn., and the lowest (7.9) for Lynn, Mass. The highest infant mortality rate (137) appears for Fall River, Mass., and the lowest for Bridgeport, Conn., Kansas City, Kans., and Seattle, Washington, which reported no infant mortality.

The annual rate for 65 cities is 13.8 for the twenty weeks of 1930, as against a rate of 15.2 for the corresponding weeks of 1929.—*Department of Commerce.*

DR. HAWES CRITICIZES THE CITY OF BOSTON IN ITS RELATION TO AID OF TUBERCULAR CHILDREN

In a spirited communication to the Boston Herald of May 21, 1930, Dr. John B. Hawes, 2d, President of the Boston Tuberculosis Association, criticizes the City of Boston for not rendering financial assistance which would enable the Prendergast Preventorium to take care of tubercular children. Because of this inability to receive aid from the City the Preventorium will be obliged to curtail its activities and these children will be deprived of the service hitherto rendered.

Although the Health Commissioner has an appropriation of $100,000 to pay for the board of tuberculosis patients who cannot be admitted to Mattapan, according to the Mayor this money is not available for the care of children in a privately organized institution.

Dr. Hawes' contention is that since the City of Boston can pay for the care of its tuberculosis patients in Rutland, it ought to be able to provide the same service for children in the Preventorium.

Mayor Curley on the other hand has called attention to the fact that the City cannot provide the necessary money for the maintenance of a preventorium and that the request of the Boston Tuberculosis

Association to have the City take over the management of the Preventorium does not meet with the favor of the City Hospital trustees or Health Commissioner Mahoney.

It is unfortunate that the City is unable to render the necessary assistance to this important agency dealing with Tuberculosis. Apparently the only resource will be, in bringing to the attention of those persons of means who have an understanding of the need and who are interested in maintaining the Preventorium, the fact that contributions are essential to meet the necessary expenses.

THE AWARD OF THE CAMERON PRIZE FOR 1930—This award has been made to Dr. George R. Minot and Dr. William P. Murphy. The Cameron Prize is conferred annually by the University of Edinburgh for an outstanding contribution to medical therapy. This brings to Boston another honor in recognition of the great contribution to the therapeutic use of liver in the treatment of primary anemia. This work is being extended by further studies of these men so that secondary anemias will probably be equally well managed in the future. The *Journal* congratulates Drs. Minot and Murphy for the honor conferred.

INSTRUCTION RESPECTING THE HARRISON NARCOTIC LAW—Mr. Chester H. Clark, Chief of the Narcotic Division in the office of the Collector of Internal Revenue at Boston and well known to the medical profession throughout Massachusetts, is to give a lecture during the current month to the students of Boston University School of Medicine on "The Harrison Narcotic Law as it applies to physicians".

The purpose of the lecture is to acquaint the students with the requirements of the law and to advise them as to their rights and privileges under the Act.

CORRESPONDENCE

DR. FRANK H. LAHEY ISSUES A DISCLAIMER

Editor, *New England Journal of Medicine:*

I wish to state that the employment of my name in recommendation of a petroleum investment project by one Frank S. Quinn of Tulsa, Oklahoma was done without my knowledge and entirely without my consent. I wish to take this opportunity to state that I have never heard of Mr. Frank S. Quinn and have no knowledge of his investment scheme or of his personal honesty. I wish also to state that I have forwarded the circular on the back of which my name is referred to under recommendation and references to the Post Office with a complaint and a request for an investigation.

(Signed) FRANK H. LAHEY,
605 Commonwealth Avenue, Boston.

IN DEFENSE OF STATE MEDICINE

AN ADDRESS BEFORE A LEGISLATIVE COMMITTEE

G. W. HAIGH, M.D.

Mr. Chairman and other honorable Members of the Legislative Committee upon State Administration:

I am one of the petitioners of House bill No. 351 and a resident of Worcester, where I have been engaged in the private and hospital practice of medicine since 1912, with the exception of nearly two years during which I served as a medical officer in the navy. During those years, I gained an insight into the functioning of a coöperative medical service in contrast to the individualistic form of civilian medical practice. Soon after having resumed my practice I began to realize the advantages of a government medical service over the chaotic conditions of private practice and gradually became a strong advocate of state medicine, a free, universal, complete medical service.

Since 1925 I have had published articles about the subject in the *Boston Medical and Surgical Journal*, June 1925, the *Harvard Graduates Magazine*, June 1928, the *American Journal of Sociology*, Nov. 1928, and the *North American Review*, Feb. 1929. From these I shall quote rather freely.

You yourselves, must already be aware of the growing dissatisfaction with the prevailing medical practice. Quite recently one of the founders of the famous Mayo Clinic was quoted in the daily papers as having declared that nowadays there was too much salesmanship in medicine and too little humanity. Back in 1916 even, in articles in the *American Magazine* Dr. Richard Cabot, with an international reputation as a teacher of medicine and of social ethics, deprecated the failure of the large middle class to receive the benefits of scientific medicine because they depended largely upon treatment rendered by physicians as competitive individuals, and not as coöperative members of hospital staffs. He confessed that this applied to him, himself, and that, paradoxically, he could not serve his pay patients who hired him personally as well as his charity patients whom he attended as one of a team of workers. The deficiency of medicine today, furthermore, has been graphically shown by a report of statistics revealing the astonishingly small proportion of several thousand inhabitants of a middle western state, who, when ill, seek advice from doctors of medicine; namely, a mere six per cent. So, you can understand why according to a statement attributed to Dr. H. L. Willett, Jr., Assistant Director of the Gorgas Institute, 61% of deaths are due to preventable diseases.

Now it is generally admitted that modern medicine on account of its growing and multiplying branches, demands coöperation. Coöperation can be secured and assured only through organization. Economic organization of physicians has not kept pace with the rapid progress of the medical sciences. It is limited to the larger public health departments and hospitals. It should be extended to cover the whole realm of medicine, which comprises two comple-

mentary divisions, of which one, preventive medicine, waxes, as the other, curative medicine, wanes. The fundamental problem, therefore, is what sort of organization, by unifying and coördinating the growing and multiplying specialties of preventive and curative medicine will provide for the people the best service for both preserving and restoring their health and vigor.

Of the possible medical bodies that might furnish such service, there are four: A priesthood, a private corporation, a public corporation, and a government corps. The first, a priesthood, can hardly be created, but must arise spontaneously through the inspiration of a leader and his disciples striving to effect a dire reform. To await the advent of any such order to reform medicine would be not only gross delinquency, but also rank folly.

Private corporations or partnerships would be somewhat comparable to private group practice, which has not yet demonstrated its suitability for the middle and lower classes. This form of medical service extended to the different classes of society could with difficulty survive the initial period of establishment because of the indefinite amount of capital necessary to enable the competing companies to prove their superiority over the other health agencies as well as over one another. They would not, moreover, eliminate the deplorable waste and excessive cost in a service so essential as one for health and accidents.

No more adaptable as a coöperative system of health and accident would be a public corporation corresponding to the public utilities supplying electricity, gas, and transportation. What would be the unit of area or of population allotted to each public service corporation? How would the different companies be regulated and controlled? The migratory nature of many people would preclude a corporation with a field of operation less extensive than a county. As county lines divide some centres of population, they would not serve as suitable boundaries for the separate companies. If the commonwealth granted an exclusive franchise to a single public corporation for providing medical care, it would have to withdraw from the field, itself, and to discontinue its own numerous public health agencies. As a matter of fact there is no precedent whatever for the enfranchisement of any such public service corporation, and no existing institution to serve as a nucleus for its formation.

The only means of completely and efficiently organizing the profession for the betterment of medical practice, therefore, is a government bureau of medicine and surgery. This to many may smack of socialism. But let them reflect that after the need for public education was generally acknowledged, the idea of offering to all children free instruction was no more socialistic. Whereas education concerns only a part of the people only a part of their lives, health, which is of prime importance, concerns all the people all their lives. Since moreover there is no constant or exact demarcation between preventive medicine and curative medicine, between private health and public health, private health becomes a matter of public moment as soon as private agencies are found wanting. Since the medical profession has signally failed to furnish proper service at a reasonable cost, and the individual practitioner is devoting his attention chiefly to the cure rather than to the prevention of disease, it behooves the people through you, its representatives, to adopt such a system as this bill is designed to found.

Such a public service necessarily, as our public schools do, would compel its beneficiaries to forego their choice of any individual physician and to accept the offices of the one or more medical men designated to serve them. This would not entail any hardship but would be a distinct advantage in this day of specialization, when so many persons need to be directed to the source of the best treatment without the delay that so often results if they try to choose the best qualified doctor. Surely the doctor is far better able to judge where the most prompt diagnosis and the most effective treatment can be obtained than are so many patients themselves, who now wander from one rival physician to another without relief till at length they reach the hospital beyond cure. Already the physician or surgeon engaged in hospital practice is losing his identity; for whereas, formerly the common inquiry was, "What doctor did you have?" today it is, "To what hospital did you go?" Formerly, persons might be served by their family doctors from birth to death; nowadays they are brought into the world by obstetricians, attended by pediatricians, operated upon by rhinologists, examined by school physicians, treated for broken bones by orthopedists, operated upon for appendicitis by general surgeons, and examined by factory physicians; subsequently, they may consult cardiologists and specialists in diabetes; in the meantime they have without doubt required the services of the Roentgenologists, dermatologists, and dentists. Is it not quite evident that in such a jumble of divided responsibilities in order to take the place of the vanishing family physician with his intimate knowledge of the patient and the patient's family, there is urgent need of some guiding and correlating agent and of complete, permanent health records.

The ability of such a corps to maintain the present high standard and steady progress of scientific medicine, however, is doubted and even denied by many conservative doctors and laymen. They assume that individual competition is requisite as a goad and that initiative is repressed by orderly coöperation. Now in any profession to which only the learned should belong, an opportunity to work intelligently, itself, suffices as a stimulus to effort. A decent living is sufficient material compensation. For several decades, in fact, most contributions to the advancement of medicine have emanated from clinics, laboratories, or institutes manned by salaried personnel working together. Even members of the medical profession financially independent, furthermore, have shown initiative and energy in the pursuit of such scientific research and in the establishment of renowned clinics, dependent upon team work. Since 1906, in fact, the professional standing of the medical officers of the United States Navy as

well as those of the Army and Federal Public Health Service, has been acknowledged by the American Medical Association to be above that of the civilian physicians in general, because the former are admitted to fellowship automatically, by virtue of their commissions, whereas the latter are eligible only by meeting certain qualifications. Since only representative graduates in medicine enter these Federal Services, the organizations, themselves, must foster a grade of practice higher than that of civilian doctors, who, in their need or in their greed are influenced by monetary considerations and distractions. Moreover, it was to be observed by those physicians serving in the Navy for the duration of the World War that the regular naval personnel had the utmost confidence in its medical officers. Some of these who were financially able and physically free to consult eminent civilian doctors gladly availed themselves of the services of their own doctors. Has not Congress shown its esteem for the Medical Corps of our navy and army by recently having voted for its members while staying in Washington the right to free medical service?

Another objection to Government medicine is its alleged prohibitive expense. Just reflect upon the extravagance of the present incoherent, multifarious health agencies in our commonwealth. First, there are the State organizations, including the Commission of Public Health with its manifold divisions, with field and hospital forces of mental diseases, tuberculosis, communicable diseases, cancer, bacteriological and serological laboratories, the Department of Public Welfare with its hospitals, and the Industrial Accident Board with its exasperating medical problems. Second, the Federal health services, public health, child welfare and maternity, and also various private national societies and institutes of hygiene and medicine with State branches. Third, the local boards of health with their hospitals for contagious diseases, and the school health department, police and private ambulance services, diverse hospitals, municipal as well as private, charitable and industrial, general and special, different health centers, district nursing societies, Red Cross workers, private physicians, and nurses, pharmacists, masseurs, cultists of nearly the 57 proverbial varieties, mediums, quacks, abortionists, herbalists, fakirs, and dispensers of patent medicines. To what the total expense of these confounding factors amount must transcend the estimates of my copetitioner, Mr. A. C. Bang. They must be as prodigious, as prodigal in comparison to his estimated cost of a system, arranging and uniting the many diverse worthy agents and eliminating competition in a public necessity more important than all the public utilities. The expense of the latter would actually prove to be as much less than that of the former, as its efficiency would be greater.

As the value of hygiene comes to be better appreciated and as the progress of civilization renders mankind economically more and more interdependent, the functions of the civilian physician become identical with those of the naval medical officer; these are primarily, to keep the personnel fit for duty and secondarily, to restore them to fitness for duty. Without an excellent organization the medical corps of the Navy and Army would surely have broken down during the World War under the strain of the sudden and vast recruiting of their respective numbers. That they met that supreme test nobly, no one would dispute. Then, why can not that organization be applied to civilian practice? To serve effectually the civilian population relatively immobile and constant, in contrast to the mobile and variable naval and military forces, should be a far less difficult problem. Actually, it would be found to possess such reserve capacity as readily to cope with the human disasters caused by storm, floods, accidents, or conflagrations.

In the adaptation of this Government medical service to the public the unit would be the district hospital with such different departments as eye, ear, nose and throat, orthopedic, obstetric, pediatric, genito-urinary, neurological, mental, convalescent, and incurable. It would vary according to the populousness of its territory. In the largest cities the different departments might be represented by institutions separate from one another, but closely affiliated with the general hospital, which would provide a clearing house for patients and a headquarters for the personnel and the permanent health records. Besides, there would be auxiliary health and accident stations in factories and shops where enough people were employed, and also in rural communities too remote to be served directly by the central hospital staff. Temporary relief stations might be set up for celebrations, exhibitions, athletic contests, and entertainments when people gathered in large enough crowds. Mobile field companies might be dispatched expeditiously for service among communities stricken with epidemics or catastrophes. Medical officers on the hospital staffs would minister to those unable to visit the out-patient clinics, whether or not in need of hospital treatment. Eventually, however, nearly all patients incapacitated by curable diseases or remedial injuries would be confined to the appropriate hospitals.

Over these medical groups would be a central professional bureau like that of the Navy. This would be manned by medical officers and their assistants under the direction of a medical administrator, who alone would be appointed by a layman. In order to eliminate politics from the operation of this service he would be selected by the Governor only from those medical officers of the two or three highest ranks. This State Health Department would encompass the existing Commission of Public Health and the medical duties of the Industrial Accident Board and the Department of Public Welfare.

The personnel would comprise doctors, dentists, nurses, pharmacists and chemists, technicians, and any others that should be found advantageous. The professional members would be paid approximately according to the schedule of pay for the medical personnel of the navy. The salaries with the usual allowances for living quarters would be determined by two factors, the length of service and the rank. Promotion would be governed by examination. Every

one of the personnel would be obliged to devote his full time to the service. Full time contract medical practice is profitable and inspiring. Part-time practice on the other, to which contract medicine owes its stigmata, has always been cheap and degrading, because those engaged in it have been prone to slight it for the care of their private patients. It has been a stepping-stone to private practice on which many a life has been crushed.

How well the proposed government bureau would function will now be shown. It would supply to any and all a free, universal medical service, which might eventually be just as compulsory as our educational system, since no patient should be permitted to lose his life or his health through ignorance or fanaticism. Satisfactory substitutes would have to be recognized, since the wealthy might continue indefinitely to employ private physicians and nurses. They would be compelled, though, to comply with the accepted standards, as is the case with our private schools. Those individuals not sufficiently educated or morally fit to administer to the sick and the wounded, it would largely eradicate, directly by exposing them with impartiality, with no personal profit to the profession itself, and indirectly by providing an organization which would assure harmonious coöperation in proffering to the public the full blessings of up-to-date medicine.

State medicine, furthermore, would remove for many the present inhuman impediment to prompt diagnosis and effectual treatment; namely the expensiveness of competitive medicine. This has finally instigated the creation of the Committee on the Cost of Medical Care with headquarters in Washington, D. C. Since the cost is only one evil, this committee can not, however, effect the necessary reform—a task for the legislators of the people. In many instances, nowadays, necessary operations upon children are postponed for purely financial reasons. Too many tired housewives and harassed fathers must forego the cure of annoying impairments because of the forbidding cost. In some cities the members of the middle class with self-reliance pay fees ten times as large as they ought, because nine others without self-respect pay nothing. People with precarious equities in their homes are often unfairly compelled to pay for services rendered to their families, whereas those with not a little intangible wealth escape payment.

This organization would assume entire responsibility for returning patients to work as expeditiously and as impartially as possible. The conscientious would be discouraged from resuming their occupations too soon, the dishonest would be discouraged from unduly prolonging their convalescence. It would insure patients receiving an examination at the end as well as at the onset of any illness or injury severe enough to keep them away from their usual duties. The final examination might disclose defects that would indicate a change of habits or occupation. Nowadays the unintelligent and the parsimonious are willing to spend money upon ineffective, even harmful therapy, but unwilling to pay for a thorough examination uncovering the root of the trouble. It would, of course, guarantee physical examinations at whatever periods were deemed desirable for those of different ages and of various occupational hazards. Free medicine, alone, would not only make available to every patient all the resources in knowledge and skill of the whole system, but would also furnish the means by which they would become most accessible, medical advice ad libitum.

This system moreover would correct the incongruous and unreasonable positions of doctors in the present chaotic condition of medical practice. Recent graduates would become probationary members of the medical corps as soon as they were acceptable as internes in a general hospital. As paid officers in the service they would be induced to take more personal interest in their patients and more pride in the standard of their work; whereas now they are too prone to regard the patients' afflictions as impersonal medical problems and are too anxious to finish their appointments which mark the final stage in a too expensive and prolonged preparation for their careers. Besides, they could be supervised more closely and disciplined more efficaciously. Instead of serving one or two years during which they give less than they receive they would remain in the status of internes with pay for about five years, being worthy of their hire.

The aspirants for specialties would be trained only after thorough experience in general medicine. When fully trained, unlike so many immature and untrained specialists of today they would not be tempted to devote a part of their time to general practice for purely financial reasons. Being interested only in augmenting their incomes, these unbridled pseudo-specialists are not infrequently guilty of haste and carelessness, and also of abusing the confidence of long trusting patients. The most complacent doctor will admit that specialization today is in as great need of control as was the practice of medicine before the enactment of the state law for the registration of physicians.

The older physicians in general would not be constrained to do things in which they had ceased to be interested and which they did more proficiently earlier in their careers. Under individualistic medicine experienced doctors are frequently compelled to attend to minor cases of illness or injury which do not warrant their particular attention. After any one as learned as a doctor of medicine has lanced one hundred or two hundred boils or repaired an equal number of scalp wounds, he can muster up little enthusiasm for them. He is apt to be rather slack in his technique. And no wonder! At this stage in our civilization the metropolitan bank president would hardly be expected to operate the comptometer or to count the pay roll for a customer's factory. The medical officers of higher ranks would also be relieved of emergency and night work so as better perform their duties of supervision, consultation, teaching, and administration. To undertake delicate operations, in justice to their patients, surgeons should not allow their judgment and skill to be impaired by loss of rest and by irregular habits.

Of several other glaring evils of competitive medicine that would be abolished by systematic coöperation the inconsistent financial relations between the patient and his physician was declared by the author of a recent magazine article, Dr. Joseph Collin in "The Patients' Dilemma" to be the root of the present trouble with private medicine. The longer and harder the case, the bigger the fee, and yet, the less able the patient is to pay. Since the more visits a doctor makes, the bigger the bill, many of the busiest and most popular doctors are induced to spend little time and thought in making their routine calls. Being paid by the visit and not by the time spent with a patient they cannot afford to take the time to teach him to prevent illness and to help himself. Being paid for services rendered a patient, physicians are tempted to do much that is not even desirable and consequently to meddle with nature. On account of the increasing rivalry between specialists, many resort to the commercial practice of surreptitiously giving a commission to the doctor who refers a patient for diagnosis or treatment—so-called fee splitting, but pure graft.

There is another fault state medicine would remedy, weariness and brain fag, caused by the necessity of the individual physicians having to render personal service to their patients at all times of the day and night. Under competitive medicine, however tired they may be, they are impelled to cater to their patients in order to retain their patients' good will. However fatigued, they must ever be ready to solve the most baffling problems in diagnosis, though keen perception and clear reasoning be demanded, or to undertake the most difficult operation, though calm courage and manual dexterity be required. The effects of fatigue can be demonstrated in the physiological laboratory. The direful results of fatigue on the part of the overtaxed, popular doctor have been brought home to many families bereft of dear ones or burdened with invalids.

Haste with its baneful consequences would also be discouraged by collective practice employing the economic principle of the division of labor. Dispatch inevitably gives way to hurry when on account of the gregarious nature of man, the sick and the hurt flock in increasing numbers to successful practitioners, who dare not refuse their services to any, for fear of disappointing them, or who desire not to miss any fees. Overworked practitioners have been known to dispose of their patients at the rate of one every six minutes; and yet the finger nail is more intricate than the most complex machine. Hurry results, too, when the idolized busy physician, though jeopardizing lives and limbs, is constrained to make hay while the sun shines. For, competitive practice is so exacting physically, as well as mentally, that the earning power of most successful physicians begins to decline at an age earlier than that of other professional men. It is in fact so strenuous that the mortality of doctors recruited from a picked class of persons vigorous enough to devote nearly half their lives to study and training is greater than that of the general population, including steeple-jacks and aviators. The ordinary physician conducts a one-man business entailing continuous hours of duty with diverse responsibilities as counselor not only in medicine, but often in law and religion, as bookkeeper and investor, chauffeur and mechanic, teacher and head of a neglected family. Little wonder that he blunders tragically.

Carelessness upon which individualistic practice exercises no direct check would be curbed by state medicine. Today even reputable doctors make fatal mistakes as a result of assuming too much knowledge about their older, familiar patients and accordingly making incomplete examinations of them; for the human body is so complicated that symptoms arising from an affection of one part may be referred to another part. Many observant internes have remarked about the superiority of the treatment of the ward charity patients, who are put through the routine hospital examinations and consultations, over that of the private room pay patients whose doctors assume that their familiarity with them renders the cost of such a thorough study unnecessary.

Carelessness is rife among a less reputable class of busy physicians who practice the art of medicine, the easier phase, in contrast to the science of medicine, the harder phase. These, depending chiefly upon their affability and suavity, have no time or need to keep up to date, because their very success is assured by the foibles of the benighted and the unintelligent, attracted by a crowded waiting room or a sumptuous suite of offices. Indifferent to the cause of disease, they dispense a separate pill for each of the symptoms, however numerous. To serve is not their motto, but to exploit. Other doctors equally negligent are those loathe to relinquish the care of patients to colleagues better qualified to treat them. Since it has been estimated by experienced drug salesmen calling upon doctors that eighty per cent. of the medical work is done by twenty per cent. of the doctors, it is manifest that carelessness as well as fatigue and haste must do incalculable harm, and that there should be adopted this practical system with its guides and checks.

Gentlemen, if you should still be in doubt about the immediate urgency for a radical change in the present status of medical economics just consider the undemocratic power entrusted to the individual practitioner of medicine and the inevitable abuse of that power. In spite of his vital responsibilities once licensed to practice, he is free to pursue his profession, however long he may live or whatever specialty he may choose. Ignoring the fact that doctors are only human with weaknesses as well as virtues, the people now assume that the individual private practitioner is and will continue to be honest and capable enough to require little regulation and no direct restraints.

To no other, in fact, is such absolute authority ever granted over man's possessions, even less dear. The lawyer practices before the courts, whose proceedings are public. The clergyman in aiding his parishioners in the conduct of their lives works largely in the open and is accountable to the religious denomination to which he belongs. The engineer

who may build a bridge is duly checked by both private and public agencies. The banker entrusted with the peoples' savings can invest such funds only with the approval of the other members of his financial committee and only under the regulation of the government. The teacher, finally, must adhere to an established curriculum.

And yet the conservative members of the medical profession claim that state medicine would be incompatible with our form of democracy. No wonder they oppose it. Autocratic power is rarely ever voluntarily surrendered. The physicians of Great Britain fought vehemently against the introduction of the Panel System for the benefit of the working people. After twelve years' operation, the Royal Commission on National Health Insurance in its Report of 1926 found it partly satisfactory to both the doctors and the public, but deems the ultimate solution to lie in the direction of divorcing the medical service from the insurance system and recognizing it along with the other public health activities as a service to be supported from the general funds. That is why this bill contains no insurance features. Profiting by their experience we have adopted a system with a solid foundation and a superior organization, and one more democratic and more compatible with American traditions.

Allow me at last to conclude with four quotations, quite applicable to the purposes of this bill, from the inaugural address by President Hoover.

"In public health the advances of science have opened a new era."

"Many sections of our country and many groups of our citizens are suffering from diseases the eradication of which are mere matters of administration and moderate expenditure."

"Public health service should be as fully organized and as universally incorporated into our government system as is public education."

"The returns are a thousandfold in economic benefits and infinitely more in the reduction of suffering and the promotion of human happiness."

RECENT DEATH

PUTNAM—Dr. Willard Abram Putnam, a Councilor of the Middlesex South District Medical Society from the year 1916 until his death, died after a short illness on May 21, 1930 at the age of 64. He was born in New Salem, July 22, 1865, was a graduate of Amherst College in the class of 1887 and of Harvard Medical School in 1894. He settled in Cambridge the latter year and joined the Massachusetts Medical Society. For more than thirty years Dr. Putnam served on the staffs of the Cambridge City Hospital and the Holy Ghost Hospital for Incurables. At one time he was a member of the staff of the Cambridge Hospital.

He is survived by his widow, Mrs. Lillian M. Putnam, and by a son and two daughters.

NEWS ITEMS

ST. LOUIS OFFICIALS STUDY HOSPITALIZATION FACILITIES—According to a recent statement by the St. Louis officials, who have been studying the hospitalization facilities in several large cities, Boston has the most complete that they have noted. The completion of the City Hospital program will, according to the St. Louis men, make Boston one of the finest hospital centers in the world.

St. Louis plans to spend $2,000,000 for a nurses' home and small additions to the hospital for whites and a new hospital for negroes. During the discussion, it was revealed that a hospital for the care of the chronic insane with 3500 patients is maintained by St. Louis.

CHILDREN'S HOSPITAL OPENS TWO NEW UNITS—Two new units of the Children's Hospital, constructed at a cost of more than one million dollars, were recently open to visitors for inspection. The buildings are the new physiotherapy and neurological department building at Vila and Van Dyke Streets and the nurses' home called the Gardner House in honor of George Peabody Gardner, president of the hospital. He and his sister, Mrs. George H. Monks, the late William Amory Gardner, and John L. Gardner, gave one entire floor of the new building.

The house, which is equipped with classrooms, study room, recreation room, library and infirmary, has accommodations for twenty-two nurses in separate rooms. The new physiotherapy and neurological building is to be known as the Bader Building, in honor of Mr. and Mrs. Louis F. S. Bader of Dover. It has a small gymnasium and swimming pool and is fully equipped for the treatment of all kinds of deformities and ailments resulting from such childhood diseases as spinal meningitis and infantile paralysis. A special glass enclosed roof will enable patients to lie in bed and get the beneficial effects of the sun's rays at all seasons of the year.

The building of a contagious unit, on which work starts next month, will complete the building program of the hospital and enable it to care for every kind of disease and disability in children.

DR. WILDER DWIGHT BANCROFT WILL DELIVER ADDRESS AT THE DEDICATION OF THE HALL OF SCIENCE OF THE UNIVERSITY OF SOUTHERN CALIFORNIA—Dr. Wilder Dwight Bancroft, professor of chemistry at Cornell University, is to give the address when the Hall of Science of the University of Southern California, the final wing of which has recently been completed, is formally dedicated on June 6, during a one-week Semi-Centennial Celebration of the Trojan institution. The announcement was recently made by Dr. Laird J. Stabler, dean of the College of Pharmacy of S. C.

Dr. Bancroft has a world-wide reputation, having served as vice-president of the International Union of Chemistry, and having received the honorary degree of D.Sc. from Cambridge in 1923.

During the World War he was a lieutenant-colonel in the Chemical Warfare Service. He is editor of the *Journal of Physical Chemistry*, and author of "The Phase Rule," and "Applied Colloid Chemistry".

"Modern Science" is to be the theme of his address at Southern California.

REPORTS OF MEETINGS

THE HARVARD MEDICAL SOCIETY

The Harvard Medical Society held a meeting in the Peter Bent Brigham Hospital Amphitheatre on Tuesday, May 13, 1930 at 8:15 o'clock. After the presentation of cases from the x-ray department, Dr. M. C. Sosman introduced the speaker of the evening.

The first case was presented by Dr. Pickwick. The patient was a 44-year-old farmer who first came to the hospital in October, 1924, complaining of a growth in his throat. Three years before he had had a sore throat, after which the local doctor advised tonsillectomy. The operation was refused, and a slight soreness and swelling persisted on the left side. Progressively from then until admission he developed trouble in breathing, mucous discharge in his throat, thick speech, and an increase in the size of the tumor. He lost no weight and worked every day. Physical examination on entry showed a fullness on the left side of his neck with a few palpable glands, while, protruding from the left tonsillar fossa, was a smooth, firm, slightly fluctuant, non-tender mass attached to the epiglottis and soft palate. The rest of the examination together with the clinical pathology and x-ray plates were negative. The patient was operated on through the mouth and the pathological report was lymphosarcoma.

The affected area was subsequently given three treatments in three months. He remained well until May 1928 when he noticed a swelling of the right pectoral region. Examination showed extensive firm swelling in the right axilla extending to the base of the neck. Under treatment this disappeared; he later complained of tenesmus and constipation. Rectal examination showed multiple firm polypoid masses which disappeared after six x-ray treatments. In October, 1929, a small gland in the left axilla was treated successfully by x-ray. In March, 1930, some more small glands in his right neck were treated with good results. His general condition was worse and a barium enema revealed irregularity, but no definite obstruction. After four treatments he improved. At the time of presentation he was working regularly and his general condition was good.

Dr. Jackson presented the second case. The patient was a 39-year-old salesman who entered the hospital in February, 1929 complaining of pain and stiffness in his back and difficulty in walking. His past history showed that he had had a ruptured appendix in 1907, a ventral herniorrhaphy in 1908, a left mastoidectomy in 1912, and an injured spine following a fall in 1922. His present illness began in 1928 when in bed he experienced a sharp pain localized between his left scapula and spine where it remained for a month. In November it radiated around his chest and gradually spread so that in January, 1929, it involved most of his spine and chest, and he began to have difficulty in walking and numbness in his lower legs. He had lost twenty pounds. Physical examination showed localized tenderness over the fifth thoracic vertebra, rigidity of the spine, exaggerated deep reflexes in the lower extremities, anaesthesia below the fifth dorsal spine, and incontinence of urine. Laboratory findings were essentially negative. X-rays of the dorsal spine showed a small, soft tissue mass to the left of the fifth thoracic vertebra, not involving the bone. Immediately following x-ray therapy his symptoms became much worse, but in 24 hours he began to improve. He continued to improve after each of eight treatments, these being six weeks apart. In April, 1930, a return of symptoms was noted. After two treatments he improved for eleven days when he developed the "grippe". Following this he had periods of chills alternating with fever for a few days and accompanied by pain all over his body. X-ray plates showed no evidence of the previous tumor shadow. He reëntered the house for study and was presented as a case of unknown etiology responding strikingly to x-ray treatment.

Dr. Richard Farnsworth spoke on "Senile Hyperostosis of the Skull". This condition is senile only in name as a large majority of the cases occur in middle age. It seldom occurs back of the coronal suture and is usually limited to the inner table of the frontal bone. This hypercalcification was described by Paget and Rokitansky in the middle of the nineteenth century. Forty years ago pathologists again brought up the subject. The main theories of its causation were: One, increased vascularity of bone in the elderly insane; two, heredity, syphilis, alcoholism, and erysipelas; and three, dyspituitarism.

Dr. Farnsworth reviewed the cases of hyperostosis in the Brigham Hospital as demonstrated by x-ray. He found 105 such cases out of 2200 skull examinations in the x-ray department. An overwhelming predominance in females was noted: 40% of the cases were below the age of 40, and 60% below 50 years. He divided the cases into three groups,—marked, mild, and slight. The most common diagnosis in the first group was acromegaly, while in the second it was brain tumor, usually near the hypophysis. Only two patients showed a positive Wassermann. He concluded as follows: One, 5% of all skull x-rays showed hyperostosis; two, 80% of these were in females; three, most of the patients were obese; four, signs and symptoms of dyspituitary syndrome were present, more than could ordinarily be expected in a similar series of other cases.

The second paper on "Subdeltoid Bursitis" was presented by Dr. Edward B. Castle. He pointed out that what is usually diagnosed as subdeltoid bursitis is in reality calcareous deposits in the tendon of the supraspinatus. He first gave a detailed description of the anatomy of the shoulder joint and of the me-

chanics of the muscles surrounding it. He showed that acute symptoms of bursitis are due to a rupture of the calcareous deposits in the tendon into the bursa. The cases were divided into the acute type where trauma causing rupture is the usual etiological factor, and the chronic type. In the chronic type the first symptom was pain on abduction of the arm. Recovery was due to absorption from the bursa. The pathology of the condition was essentially one of coagulation necrosis with a surrounding inflammatory reaction. Operation was the procedure of choice, the bursa and tendon being drained. Views were shown illustrating the x-ray appearance of such lesions.

Dr. Richard Light spoke on "From the Brigham Hospital to Mexico City by Airplane". Previous to this trip he had spent some time collecting data on the x-ray treatment of carbuncles. In a series of 43 cases, 65% showed improvement. He emphasized this point as the only advancement in the treatment of carbuncles in the last one hundred years. Following these remarks he gave a very interesting travelogue of his trip, illustrating his remarks with motion pictures taken from the plane.

"The X-ray Appearance of Primary and Secondary Cancer of the Lung" was the title of the last paper. Dr. Channing Frothingham omitted this paper because of the lateness of the hour.

THE NEW ENGLAND HEART ASSOCIATION

A meeting of the New England Heart Association was held at The House of the Good Samaritan, on the evening of May 15, 1930. Dr. Wm. D. Smith presided and introduced the speakers.

Dr. Howard B. Sprague spoke on "The Scope of the Work in Rheumatic Heart Disease at the House of the Good Samaritan". This hospital, according to Dr. Sprague, was founded by a benevolent woman about 1850 for convalescent female patients discharged from the Massachusetts General Hospital. Its purpose has changed from time to time. Previous to the present era about 80% of its patients were children with orthopedic troubles. About nine years ago the cardiac aspect began to be prominent and thus the rheumatic infection became the major consideration. Many changes have been made in the hospital together with a definite program for study. The hospital now has been taking the chronic cases from the beds of "acute" hospitals.

The cause of rheumatic fever, said Dr. Sprague, is now generally considered to be a streptococcus, but not a specific one. Since we do not know definitely, the situation is one of armed neutrality against the streptococcus. What has not been usually studied is the patient, his type, surroundings, white count, condition of blood vessels, etc. That, pointed out Dr. Sprague, is the purpose of the hospital because results leading to advancement in knowledge will probably be obtained by simple clinical observations.

The second paper on "A New Recording Rectal Thermometer" was presented by Dr. William B. Breed. Dr. Breed showed that until the cause and cure of rheumatic fever is found, the best thing is adequate treatment. This depends on the extent and duration of the process. To determine the end of activity is difficult, and depends on many factors. Dr. Breed discussed fever.

The rectal thermometer consisted of a tube, its poles being connected through an electrical device to a revolving sheet of paper. This in no way interfered with the activity of the child in bed, and in only the severely sick patients was it found to be uncomfortable. The normal temperature was taken as 99.8°, and charts of the temperature curves shown. Swings in temperature were noted in the 24-hour curves, which were completely unrecorded in the ward charts. The low point was found to be in the early morning, this point becoming higher in children with active rheumatic infection. Dr. Breed thought that the changes in the lower ranges were probably more important than those higher up. He made no conclusions, however, because not enough work on normal patients had been done to make sure of his results.

Dr. J. M. Faulkner presented "A Case of Adams-Stokes's Syndrome in Rheumatic Fever". He showed that whereas heart block is quite common in rheumatic fever, this syndrome was quite rare, only six cases being reported in the literature. The case was one of a young man who after a typical rheumatic attack developed repeated convulsions. His pulse was found to be 32. In the hospital the rate varied from 32 to 60. E.K.G. showed a partial heart block with a P.R. interval of 0.52 seconds, but no dropped beats of any evidence at any time of complete heart block. He had no convulsions while under observation. In a four months' follow-up he never showed any evidence of endocardial disease except a soft systolic murmur. His E.K.G. became normal. Thus, Dr. Faulkner concluded that heart block may exist due to myocardial involvement and damage without evidence of valvular disease.

The fourth paper was presented by Dr. T. Duckett Jones, and was divided into two parts. The first part was entitled "Experiences with Skin Tests in Rheumatic Heart Disease". Dr. Jones made repeated skin tests on patients for a year and presented his results. For his material he used a Burkhardt filtrate of an indifferent streptococcus. Two dilutions 1:10 and 1:50, were used, but the reactions were similar and only varied in degree. One-tenth of a cubic centimeter was given intracutaneously, and read in 24 hours. A change of six millimeters in the average of the diameters of the reaction was taken as significant. Six hundred and seventy-one tests were done on 140 cases. Sixty cases showed no change in the subsequent reactions, while the rest did. Out of all the patients, regardless of their type of disease, 94 were always positive, 5 always negative, and 41 varied. The detailed figures tended to show that potential rheumatic heart disease and chorea had a little less tendency to give varying reactions. An increase in skin reactivity was noted in 53, and a decrease in 35. An increase was the general rule with clinical improvement. Only one case died with a positive skin reaction. On the results, Dr. Jones concluded

that if a child gets a second attack, and the skin test is negative, he is in for a long siege if he survives at all. A gradient on this basis may be made.

The second part of Dr. Jones' paper was on "Follow-up Studies at the House of the Good Samaritan". An attempt was made at a follow-up on all cases since 1921. During those nine years 939 cases were received with the diagnosis of actual or potential rheumatic heart disease: 30% were followed for more than five years, and most of the cases were examined during the last two years. There were 78 readmissions. The percentage of deaths to the cases known was 25.5%, but Dr. Jones believes this percentage will come down to about 16%. The diagnoses were divided as follows: 54% rheumatic heart disease; 15% chorea and heart involvement; 21% chorea and potential heart disease; and 9.2% potential heart disease. Of the entire group 77% were clinically unchanged, 3.6% were better, and 18.9% definitely worse. Dr. Jones believes these figures on the whole show the results as good.

The meeting was extremely interesting and the discussion stimulating.

THE PLYMOUTH DISTRICT MEDICAL SOCIETY

The May meeting of the Plymouth District Medical Society was held at the Brockton Hospital May 15, 1930. The company was entertained by Superintendent Dr. Frederick M. Hollister and his staff. Dr. M. Frank Barrett, chief surgeon of the Brockton Hospital, conducted an operating clinic before a large body of physicians and surgeons representing the Plymouth District. He did four operations beginning at 9 A. M. His first operation was a hysterectomy for fibrosis. This was followed by an appendectomy. A complete examination of cervix-uteri and biopsy and a cystoscopy completed his demonstration. He was assisted by Dr. Leder, one of the internes at the hospital. After the operating clinic was over a short business meeting was held in the out-patient department. This meeting was held at 11 o'clock, presided over by the new president, Dr. Frederick W. Murdock. Dr. George A. Moore, secretary of the society, read the records of the previous meeting and they were approved. The society voted not to hold any mid-summer meeting this year. Dr. Thomas H. McCarthy, former president of the society, delivered a very touching and tender eulogy on Dr. James H. Drohan, who recently departed from this life's work. Dr. McCarthy's remarks were well chosen and well received. Dr. Harrison A. Chase of the Goddard Hospital reported a case of intussusception of a baby seven months old. He read the records of the case. The operation was performed by Dr. Peirce H. Leavitt, surgeon of the Goddard Hospital. Dr. Loring B. Packard, x-ray specialist of the Brockton Hospital, demonstrated a case of chronic pneumonia of three years' duration with numerous x-ray plates showing the different conditions of the patient. The meeting then adjourned and there was a demonstration of cases in Ward B of the hospital.

The first cases were demonstrated by Dr. M. Frank Barrett, chief surgeon of the hospital. He demonstrated a case of tuberculous peritonitis of a child 7 years old, and also a case of osteomyelitis. Dr. William G. Walker, chief of the medical staff, demonstrated two cases of cardiovascular disease. The first was of rheumatic and the second of syphilitic origin resulting in an aneurism and was beautifully shown by x-ray pictures. Dr. John F. Callahan demonstrated a case of encephalitis of a child 7 years old. Dr. John R. Noyes demonstrated a case of mastoiditis. Dr. Frederick W. Murdock demonstrated a case of optic neuritis caused by a suppurating sinus. Dr. George A. Buckley demonstrated a case in which a patient had quite a remarkable recovery from a colloid carcinoma. He also reported a case of carcinoma of the colon in which the rectum and lower bowel had been removed. Dr. Buckley stated that this man had gained 21 pounds since the operation. Dr. Frederick W. Weiner demonstrated two genito-urinary cases. One was a polycystic kidney in which Dr. George A. Buckley had removed the kidney with a favorable result. Dr. George A. Moore, surgeon-in-chief of the Moore Hospital, demonstrated a case of fracture of the sixth and seventh vertebrae, so-called broken neck with a complete recovery. This woman was over 70 years old.

After the demonstration of these clinical cases in Ward B, the society retired to the large dining hall of the Brockton Hospital where a very fine luncheon was served. There were over 50 physicians and surgeons present. The superintendent of the hospital, Dr. Frederick M. Hollister and his medical staff headed by Dr. M. Frank Barrett and Dr. William G. Walker, deserve a great deal of credit for the entertainment. This is the first time that any demonstration of this kind has taken place on such a large scale and it was an excellent piece of work.

All members of the society seemed to be enthusiastic over the coming meeting of the parent society to be held in Plymouth, June 16, 1930.

SOCIETY MEETINGS, CONGRESSES AND CONFERENCES

March-October — International Medical Postgraduate Courses in Berlin. Complete notice appears on page 853, issue of October 24, 1929.

June 22-24—Thirty-first annual session of the American Proctologic Society. Complete notice appears on page 1028, issue of May 22.

June 23-27—Annual meeting of the A. M. A. Auxiliary. Detailed notice appears on page 981, issue of May 15.

June 23-July 12—The Fourth Public Health Institute. Complete notice appears on page 839, issue of April 24.

June 24—American Heart Association, Inc. Detailed notice appears on page 934, issue of May 8.

July 10-12—The American Association for the Study of Goiter. Complete notice appears on page 935, issue of May 8.

September 4-8—Fifth International Congress on Physiotherapy. Complete notice appears on page 906, issue of October 31, 1929.

September 8-12—Postgraduate week of Physical Therapy. Detailed notice appears on page 1025, issue of May 22.

September 26-27—New England Surgical Society. Detailed notice appears on page 1028, issue of May 22.

October 27—The American Public Health Association. Detailed notice appears on page 1271, issue of December 19, 1929.

March 23-27, 1931 — Fifteenth annual clinical session of the American College of Physicians. Detailed notice appears on page 790, issue of April 17.